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A new transmission system utilizing the already existing media is imperative to the efficient utilization of the audiovisual materials available as teaching aids to the educator. Current practices in audiovisual distribution cause frequent frustrations in availability. It is also difficult to find up-to-date cataloguing that teachers can refer to. Research was undertaken to determine the major problems of existing media centers, and an in-depth study was made of the Sacramento Unified Schools Instructional Materials Center and of the Alameda County Schools Curriculum Materials Center, both large California districts. A computer-controlled system is suggested which will carry with it new possibilities for instructional film use but possible under the present manual system. The proposed system is addressed to the problem of making materials available for classroom use in the most expeditious manner possible. The system involves multi-purpose computer terminal stations in each school with access to a regional computer center. Recommendations are made for further study to define engineering requirements, for financial aid programs to implement the system, and for pertinent legislative reform, as well as for training for the media specialist and "re-education" for educational film producers. [Not available in hard copy due to marginal reproducibility of original document]. (SH)

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Charles Joseph Vento

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PREFACE AND ACKNOWLEDGEMENTS

As an audiovisual specialist since 1950, this writer has been concerned with the multitude of problems opposing the teacher's utilization of instructional materials. Regardless of the teacher's desire to provide learning experiences for students at the "teachable moment," inexpedient audiovisual utilization methods may counteract the teacher's efforts.

A study of the literature shows extensive respect for the teacher's dilemma in media utilization. However, there is a lack of research and development designed to solve this dilemma. Development of a proposed total system seemed to be an appropriate *modus operandi* for attacking the problem. Hopefully, this proposal would provide the design requirements to allow teachers an optimum media utilization environment. As a teacher commented in a discussion about the proposed system, "How agreeable it would be not to have to fight the complex of machinery, noise, and scheduling problems in order to use a film."

Grateful acknowledgement is given to the late Dr. Vaughn D. Seidel, former Superintendent of the Alameda County Schools, who started me on a career in the audiovisual field, and who died as the final writing of this

paper was in progress. The many people in the audiovisual centers in California, who assisted me in defining the problems and allowing me their facilities and staff, are too numerous to list but deserve mention.

Engineers and sales representatives from the computer companies gave me assistance, including International Business Machines, Control Data Corporation, Honeywell, and Boole and Babbage (Systems Engineering Firm, Palo Alto, California).

Special tribute is given to my Chairman and Advisor, the late Dr. James Finn, who opened the door for me to Instructional Technology as keynote speaker during the DAVI Conference in 1955 in Los Angeles. This was the impetus that culminated in a program of studies providing an "old line A-V Director" the opportunity for a "retread."

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CHAPTER I

INTRODUCTION TO THE PROBLEM

> It is indeed ironical though perhaps to be expected, that a private foundation should have provided the impetus for something in which the traditional educational establishment has such a large stake. It would appear that all too often in this country innovation in education comes not from educators but from government, foundations, or industry.[1]

Introductory Remarks

Whereas in most other professions technological developments are employed to increase the productivity of the available work force,[2] public education continues the unnecessary wasteful deployment of its most valuable asset: its staff.

We live in a world where a continuous expansion of knowledge and scientific breakthroughs are commonplace. Each day our teachers are faced with not only the problem of transmitting new knowledge, but with the awesome responsibility of insuring that the young people in their trust actually understand it all.[3] The educational problems are so complex that it is no longer wise to allow the teacher to work alone and unaided. Without the application of sophisticated technology it is difficult to see how the teacher of today, numerically small in relation to the known student population, will be able to lead each student to explore, to learn, to evaluate, and to master the prodigious quantity of evolving knowledge.

---

[1] Hartford N. Gunn, Jr., "Space Satellites and Education," *Phi Delta Kappan*, KLVIII, No. 5 (January, 1967), 227.

[2] J. D. Boulgarides, and V. C. San Filippo, "The Dilemma of Technical Obsolescence." Douglas Missile and Space Division, Paper No. 4614 M, October, 1967, 29.

The purpose of interjecting technology into education is to come up with the efficient meaningful division of labor between man and machines, but always subject to the rational control of the human being.[4,5]

> The nature of industry and education in today's complex society has made it necessary for the generation and utilization of more and more audiovisual aids to assist in communicating ideas. Once generated, however, it becomes difficult to locate and use these materials.[6]

It is no longer possible for media personnel to maintain an effective and efficient procedure for the use of motion pictures by classroom teachers.[7] The more refined a particular area of study becomes, the greater the problem of locating relevant information. Production of films continues at an increasing pace. Federal support programs infuse the production industry with increased energy to expand production, but the knowledge of its availability is missing. The increased commercial effort is dynamically illustrated by Hope's report[8] of educational film production. He states that 9,200 non-theatrical films were produced in 1962. Production in 1963 increased to 9,680 films. Today production of films is well over 10,000 titles. It is almost impossible for the media specialist to keep pace with the continuing flow of information about new materials.

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[3] Derek J. DeSolla Price, "Little Science, Big Science," (Columbia University Press, New York, 1963), 115.

[4] Boulgarides and San Filippo, *loc. cit.*

[5] D. A. Loehwing, "The Challenge of Technology," An I.D.E.A. Occasional Paper, Dow Jones and Company, 1967, 12.

[6] Michael H. Halperin, "RIFLE: A System of Audio-Visual Indexing, Storage and Retrieval." Address delivered at the Audio-Visual Education Association of California Conference, Asilomar, California, January, 1965.

The harried teacher finds it extremely difficult to maintain current knowledge of materials. The treadmill is evident; the lag becomes greater.

To what extent, then, can the current technical know-how be coupled with the power of a computer to provide the teacher with the necessary tools that will permit him to utilize his skills as well as his time with the utmost efficiency?[9]

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[7] Ernest A. Ballif, "An Investigation of Methods of Predicting the Performances of Automatic Controls," *Dissertation Abstracts*, XIII, No. 6 (1953), 1139.

[8] Thomas W. Hope, "Nontheatrical Films Interim Report No. 5," *Journal of Society of Motion Picture and Television Engineers*, LXXIII (1964), 675-8.

Although there are other areas where the computer can be used to augment the educator's function, this study is addressed to the problem of making available, and providing audiovisual materials to the classroom in the most expeditious manner possible.[10]

The elusive goal of having "what the educator needs at his school when he needs it" is not possible to satisfy under the present "modus operandi."[11,12,13,14,15]

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[9] John L. Burns, "Our Era of Opportunity," *Saturday Review*, (January 14, 1967), 38-9.

[10] William F. Luebbert, "Information Processing in Large Communications Systems: Its Applications to Dynamic Control and Counting Problems," *Dissertation Abstracts*, XXVI, No. 5 (November, 1965), 2648-9.

[11] Neal E. Miller, *et al.*, "Graphic Communication and the Crisis in Education," *Audio Visual Communication Review*, V, No. 3 (1957), 120.

[12] Philmore L. Groisser, "The Development of Audio-Visual Instruction in the New York City Public School System," *Dissertation Abstracts* (New York University, 1953), XII, No. 6, 1038.

[13] Charles A. Elliott, "A-V Materials Used in Industrial Education in the Secondary Schools of Illinois," *Dissertation Abstracts* (University of Missouri, 1953), XIII, No. 6, 1035.

[14] David P. Barnard, "A Study of the Audio-Visual Administrative and Supervisory Functions in Selected Schools of Vocational and Adult Education in Wisconsin," *Dissertation Abstracts*, XV, No. 11 (1955), 2068-9.

[15] Edward O. Minor, "An Analytical Study of Audio-Visual Programs in Four Year Accredited Negro Colleges and Universities," *Dissertation Abstracts*, (Indiana University, 1954), XIV, No. 10, 1597-8.

One of the major roadblocks in providing audiovisual materials for "that moment" when best suited to the instructional environment, is the problem of schedule and delivery from the centralized storage to classroom.

Coupled with the need to know about pertinent materials, is the responsibility the teacher must assume of knowing the learning abilities of his students. Data on student achievement is necessary to the proper selection and use of media.

Major Problem Areas

The need for a systematic study was apparent in the early stages of the investigation. Through the analysis and synthesis of each function within the total center's structure, the writer was able to define the relevant data which are applicable to the definition of storage and retrieval requirements. The operations of a total instructional materials center revolves around four major functions: film acquisition, film cataloging, booking, and distribution. Each of these functions has many problems associated with it. In fact, these problems have been recognized, as evidenced by the emergence of a number of semi-automated systems that serve to alleviate the situation as much as possible. However, the difficulties in achieving adequate capability to cope with the problems can be boiled down to one predominant factor - an ever increasing volume of work!

Access of materials will necessitate automated procedures to acquire and deliver educational materials to teachers. Agreement among researchers concerning the need for an efficient system is overwhelming.[16]

The scope of a systematic approach, such as this study attempted, incorporates all the procedures in the instructional materials center and school as related to the processing and utilization of educational film. Electronic data processing procedures, when applied to the film in a manner suggested in this study, will hopefully alleviate the burdens associated with utilization. Descriptions, biographical data, and cost data about media are fairly easy to store and retrieve. However, the storage and retrieval process of audio and visual portions of films for data processing procedures is extremely complex. Should it be feasible and possible to incorporate computer technology for total film handling, the process for storage of other media may be more easily achieved.

Optimum utilization of films for teaching will undoubtedly call for computer processing of acquisition, delivery, and reporting data. The speed and convenience with which such data can be handled promises to reduce, or eliminate, many of the difficulties teachers presently experience when using films.

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[16] Paul A. Anderak, *et al.*, *The Feasibility of a Cooperatively-Owned Multi-Purpose, Multi-Channel, Closed-Circuit Television System for Instruction, Materials Distribution, and Administrative Data Handling*, A Report of the North Circle Pilot Project, Phase A, OE4-16-024 (St. Louis County, Missouri), 1965, 186.

The current practice of review, evaluation, acquisition, and distribution introduces a considerable gap (one to two years) between the time a film is released for use, and its instructional use in the classroom. Purchasing on a quarterly, semi-annual, or annual schedule is a contributing factor.

There is also a time lag between the ordering and the receiving of a film by the educator. Most systems require as much advance notice as a teacher can possibly give for each order. Generally, two weeks are required for a given delivery date, and for some of the more popular films a minimum of one month's notice may not always result in a guaranteed booking for the given film. Consequently, experienced teachers avoid last minute rush for films by ordering a semester in advance, or sometimes even as much as a year in advance. These teachers are therefore trying to predict, approximately eight months in advance, the state of learning that a student will have reached by the time the film will be used for instruction. The media centers are also faced with problems of continued increases in operating costs with no commensurate increases in the offered services.

The centers continue to face the need to purchase more duplicate prints of existing titles to satisfy peak demands. The print replacement problem is ever mounting, as the number of new schools built every year continues to increase. Due to the "wear and tear" a film receives in handling during shipment, during projection in a school, and during the in-processing routine, the film life is limited. It requires a considerable portion of the center's budget for film replacement alone.

Another aspect of the media center to be considered is the historical context in which centers developed. Instructional materials centers in California had their beginning after World War II. Service men in the training aids programs of the Armed Forces were recruited in a seemingly massive effort to establish audiovisual programs in large cities and in most counties. The County School Service Fund, the state financial support program, was the catalyst for assistance in this development. The "Training Aids Officers" did adapt the systems of their service connected programs to these new civilian programs.

Many procedures in the present centers, adopted in the post-war period, still exist today. Some of these procedures have been improved but remain basic to the original system. Distribution and utilization procedures, with the exception of minor improvements, remain tied to original patterns. For example, booking cards are filed on a motorized wheel rather than being filed in trays which are pulled from and replaced in a rack by hand.

Barriers to Utilization

The present state of the art, in itself, is a major barrier to use by the teacher. Examples of these barriers include the characteristics of media which determine utilization such as: cost of equipment and materials, equipment operation, room modification, and scheduling. All contribute toward the lag in the effective employment of educational technology.[17]

Juxtaposed to the technical problems related to the utilization of equipment and materials, is that the teacher also must be aware of the emerging patterns of curriculum, concurrent materials developments, and the availability of all new tools of instruction from the district service center. The responsibility for this massive information flow is placed upon the teacher; subsequently, an operational change is necessary for the "tooling-up" process, of which the Technological Development Project was concerned, to meet the challenge of a new technological society.[18]

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[17] C. F. Hoban, *Obstacles to the Use of Audio-Visual Materials*. Forty-Eighth Yearbook of the National Society for the Study of Education (Chicago: University of Chicago Press, 1949), 53-71.

Leverenz makes a point of this:

> All the equipment together, however, are definitely too many and too complicated for any one teacher to master thoroughly enough to use with the confidence and serenity that induces receptiveness and confidence in learners.[19]

Some teachers are relieved of the burdens of utilization - they simply refuse to use educational films.

An exhaustive study of the barriers attributable to utilization[20] concluded the following:

- The physical limitations of the equipment: Operation and maintenance of the hardware is cumbersome and sometimes unreliable.
- Accessability of equipment and materials: The problems of acquiring, scheduling, and preparing for utilization are often too complex.

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[18] J. D. Finn, D. G. Perrin, and L. E. Campion, *Studies in the Growth of Industrial Technology I: Audio-Visual Instrumentation for Instruction in the Public Schools, 1930-1960. A Basis for Take-off.* Occasional Paper No. 6, (Washington, D. C.: National Education Association Technological Development Project, 1962), 108.

[19] H. W. Leverenz, and Malcom G. Townsley, *The Design of Instructional Equipment: Two Views*, "Instructional Equipment I," Occasional Paper No. 8, (Washington, D. C.: National Education Association Technological Development Project, 1962), 51.

[20] Charles J. Vento, "Teacher Acceptance or Rejection of the New Instructional Media and Consequent Effectiveness," 1963 (Mimeographed).

- Appropriateness to learning level: Materials may be selected which are inappropriate to the subject matter being taught.
- Physical facility: The limitations on the structure in which materials are being used include ventilation, darkening, seating, and power source.
- Budgets: The omnipresent problem of financial limitations reduce the teacher's capability in utilization. The resultant lack of sufficient materials may be discouraging to the teacher which subsequently effects his attitudes.

In a five year study, Godfrey[21] similarly points out that procurement procedures, scheduling, and ordering continue to be major barriers to utilization. Even though a broad selection of films is available from cooperative libraries and rental sources, instant service is unavailable.

Problem Inter-Relationships

In review, the bulk of work currently involved in processing audiovisual material is in cataloging, selecting, booking, shipping, and the actual using of the films at a given school. Cataloging systems, ordering systems, and display systems need to be revised. A catalog distributed to every potential client is still the same kind of catalog, whether printed by yesterday's mineograph or today's IBM machinery. An ordering system which depends upon human processing is the same kind of ordering system, whether it is yesterday's totally manual system or today's semi-automated system. A projection by optical means is still the same kind of projection, whether the light source is yesterday's kerosene or today's quartz iodine lamp.

---

[21] Eleanor P. Godfrey, "The State of Audiovisual Technology 1961-1966," Monograph 3 (Washington, D. C.: National Education Association, 1967), 30.

It is no wonder that the teacher finds it more convenient to lecture on a given topic without the use of motion pictures. Should the teacher wish to use a film, he must go through the following steps:[22]

- Know it exists
- Find its location
- Order it
- Schedule it
- Preview it
- Schedule it for class showing
- Get necessary projection equipment to set up
- Return the equipment

---

[22] Miller, *et al.*, *loc. cit.*

Each of these steps has accompanying problems, the most notable ones being:

- Scheduling problem
- Film unavailability when needed
- Late deliveries
- Prompt return of the film
- Inadequate reviews
- Equipment failure

These are all deterrents that prevent the educators from using films as often as necessary, and it is apparent that the real barriers are not in the materials but in the physical or organizational problems relating to the acquisition and utilization of these materials. The teacher's dependence upon uncontrollable procedures discourage his use of and dependence upon the resources which may contribute significantly to learning goals. Anderak succinctly stated this dilemma:

> Current patterns requiring coordination between classroom teachers' activities and activities of outside agencies tend to diminish the teacher's control over the appropriate timing of the presentation of experiences to individual students.[23]

A teacher finds himself in an environment where a wealth of new information is being thrown at him. A science teacher, for example, must be able to "adequately" handle questions from the students on a wide range of topics which only as recently as ten years ago were "blue sky."[24] How does a computer work? What is a laser beam? How are satellites used for communication purposes? What kind of deep sea research is going on?[25] Etc., etc., etc. It is therefore necessary for the teacher to draw upon all available outside resources that can be used to assist him in the execution of his instructional responsibilities. One of the most important of resources is the motion picture.

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[23] Anderak, *et al.*, *loc. cit.*

Study Objectives

The major purpose of this study is to provide a system description and a system design for introducing modern information processing techniques into the cataloging, booking, and distributing functions for educational motion pictures.

The problem is (1) to develop a statement of requirements for the integration of these functions into one system, and (2) to offer recommendations for making that system operational.

---

[24] Father Culkin and Marshall McLuhan discuss the impact of the communications media upon students and the concurrent breaking of the monopoly of the print media for gathering information. They (students) are a product of the "all-at-once (Global) electronic environment" which is in conflict with the "linear one-thing-at-a-time school environment."

[24] Columbia Broadcasting Corporation: "Twenty-First Century," A Series of Telecasts, 1967.

It is therefore apparent that any new system of the future must provide substantial alleviation, if not total elimination, of the problems facing the instructional materials center.

Among some of the objectives to be met by the new system must be the following:

- Provide teacher acceptance and control.
- Provide ease in the use of the system by the teacher.
- Provide relatively short time intervals between ordering and receipt of the instructional materials.
- Provide information so that the teacher is current with what is available from producers.
- Provide ability for the smallest and most remote schools in the state to have an equal opportunity with a major metropolitan school in utilizing the full resources of a media center.
- Provide the ability to adapt pre-scheduled media material delivery to learner readiness schedules.
- Provide the ability of the teacher to interrupt the audiovisual display to add additional comments as required as well as eliciting class participation during the presentation.
- Provide the ability to eliminate or reduce the duplicate copy problem where possible

and minimize the replacement of materials due to damage.

- Provide the ability to transfer manual operations to machine operations in every instance where greater efficiency can be gained.
- Provide long-range economies in instruction, materials distribution, and administrative data handling.

A computer controlled system, such as the one proposed, will also carry with it new possibilities for film use not apparent under the present manual system. It is possible that even the very form of films may change radically when access to films comes under rapid, direct, and convenient control of the teacher. Early possibilities are already apparent in the emergence of looped films, videodiscs, electronic video recording (EVR), and similar modular units of information. Computerized access to an expanding library of materials will minimize the delays and errors one might expect as this expansion accelerates. For the first time, use will possibly have a chance to keep pace with potential.

Organization of the Study

To meet the specific objectives previously outlined, this study will provide for the preparation of a system description of selected centers presently in use. The descriptions of the current patterns of operation were completed through visitations and a concurrent literature review. The system as it currently exists is described in Chapter IV. The two California centers described were Sacramento City Schools Instructional Materials Center and the Alameda County Schools Curriculum Materials Center. In lesser detail, segments of other centers and facilities were studied to provide background on partial automation of cataloging (University of Southern California), booking (Los Angeles County Schools), and distribution (Beverly Hills) systems.

The specification of requirements for automating a typical system will follow the requirements as defined to illustrate the need for the complex data flow necessary in a center.[26] Required data, such as evaluation, purchasing, booking, and processing of materials, are necessary in prescribing administrative control over the center's efficient operation.

Based on the needs for data and instruction, a design of a model automated system will be prepared. The model system as described in Chapter V will hopefully provide a beginning toward the utilization of computing power for the storage and retrieval of media. The design is based on available hardware. It includes the flexibility necessary for system modification as new capabilities of automation are developed.

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[26] Jerome D. Sable, "Language and Information Structure in Information Systems," *Dissertation Abstracts*, XXIV, No. 5, (November, 1963), 1964.

To offer specific recommendations for implementing the proposed system, it will be necessary to continue the project for a number of years. The implementation, of necessity, must deal with cost factors. Since cost estimates must be based on many variables, such as rental agreements with film companies, hardware rental and/or lease arrangements, distribution system leases, materials and personnel costs, and computer software expenses, initially it will be necessary to conduct a detailed study of cost/effectiveness comparisons between the current operation and the proposed system.

Definition of Terms

There is considerable danger in over-simplification when defining terms used in this paper (see also Nichols[27]). Nevertheless, simple definitions are attempted in an effort to focus attention on the process in its entirety.

For purposes of this study, Audio-Visual Center, Instructional Materials Center (IMC), Curriculum Materials Center, Educational Media (Communications) Center, and

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[27] H. L. Nichols, "Guidelines to Audio-Visual Cataloging by Means of Data Processing," *California State Department of Education* (Sacramento, 1966), 37.

Center are used synonimously. It is recognized in the current terminology of the profession, each of these has a distinct meaning depending on the functions established and definitions used by the person responsible for his particular operation.

Should a technical clarification be more meaningful, the writer recommends the glossary in *Audio-Visual Communication Review*, Vol. II, No. 1, January-February, 1963.

Within the context of this study, the following definitions of certain key terms will apply:

Booking - The procedure used to reserve a film for the person ordering it.

Building Coordination - Individual responsible for the instructional materials program within a school. Often includes ordering, distribution, scheduling, returning of all materials to the center.

Cataloging - The process necessary to classify and code films and disseminate information to "customers" regarding their availability.

Data Bank - A file representing a complete and organized collection of data information directed toward some purpose.

Data Set - A device which provides the necessary interfacing between a terminal and the communications facilities.

Direct or Random Access Storage - Pertaining to a storage device, such as drum, disk, data cells, etc., in which the access time is effectively independent of the location of the data.

Display Unit - A device which provides a visual representation of data.

Distribution - The packing and shipping process at the center. This includes the delivery to and pick-up at the school for returning materials to the center.

EDP (Electronic Data Processing) - Data processing performed by electronic equipment, with data processing defined as the preparation of source media which contain data or basic elements of information, and the handling of such data according to precise rules to accomplish such operations as clarifying, routing, calculating, managing, communicating, and recording.

Evaluation - The process by which a person or group of persons determine acceptability of a film for purchase.

Information Retrieval - Recovery of desired data or information from a repository of such information, normally in EDP, being a data bank.

Ordering - The process necessary to acquire a film from the center.

Random Access - Pertaining to the process of obtaining data from, or placing data into, storage where the time required for such access is independent of the location of the data most recently obtained or placed into storage.

System - An assembly of procedures, processes, methods, routines or techniques united by some form of regulated interaction to form an organized whole and serving to accomplish a specific objective.

Teleprocessing - A form of information handling in which a data processing system utilizes communication facilities.

Terminal - A point in a system or communication network at which data can either enter or leave.

Utilization - The entire process which is necessary for the teacher to use a film during classroom instruction.

Summary

The objectives of the study were defined in relation to the problems which confront teachers in the acquisition and use of media. The problems defined as barriers to utilization include: (1) the hardware-software availability, (2) convenience of use, (3) scheduling problems,

(4) physical plant characteristics, (5) information lag, and (6) finances.

Because the problems attendent in the use of motion pictures seem insurmountable to a teacher, it is necessary to devise methods for overcoming these barriers. Teachers may not be "anti-media" as much as the state of the art is "anti-teacher." The characteristics of film hardware and software have not changed significantly since their introduction into education. Therefore, the objectives of this study are to define (1) the requirements of a system which will integrate the functions of acquisition, cataloging, distribution, and display of educational motion pictures, and (2) to offer recommendations for making the system operational.

Organization of the Paper

The second chapter deals with a review of the literature in an effort to define the state of the art, applications of computers to audio-visual procedures, and the use of computers in related areas.

The third chapter defines the procedures used for the study, including the non-directive and focused interview; and the purpose for the questionnaire and its value in describing the media centers in California.

The fourth chapter presents the findings of the questionnaire through an analysis of the data collected.

Details of two media centers, a city district and a county system, illustrate the procedures necessary for storage and retrieval of media from these centers.

Chapter five describes a complete four-phase system for the use of computers in conjunction with the film media.

Chapter six discusses recommendations for implementing the system, and social, legal, and educational implications for introducing this system into the education society. Several cautions toward a solution to the problem are also suggested.

CHAPTER II

STATE OF THE ART

> It should be emphasized that the shadow price of a teacher is not his salary; it is the lost opportunity cost of his using his time for one type of instruction rather than another.[1]

The System Concept

The lost learning time, which occurs in the classroom because the teacher must attend to the non-teaching trivia related to instruction and specifically to the use of media, may be a contributing factor to the disappointing results of instruction. Although great sums of money are expended for classroom instruction, test results of student achievement continue to be disheartening.

Efficient methods of instruction are being developed and the possibility of dividing the responsibilities more efficiently are apparent. This division of responsibility[2] will be implemented with the new uses of computers for individualized instruction. The role of the teacher will be educational,[3] thereby leaving the training[4] function for the machines.

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[1] C. West Churchman, "On the Design of Educational Systems," *Audiovisual Instruction*, X, No. 5 (May, 1965), 361-5.

[2] John I. Goodlad, "The Future of Learning and Teaching," *Audio-Visual Communication Review*, XVI, No. 1 (Spring, 1968), 5-15.

Although development of the media distribution-utilization system is merely a sub-system within the structure of education and training, it may provide the impetus toward achievement of an integrated mediated instructional design. The proposed system necessitates the concept of instructional management,[5] resulting in the design of instruction at the curriculum planning phase.

Researchers would meet great difficulty in an attack on education's problems and its needs for total restructuring. The best that seems achievable presently is the systematic attack upon certain portions of the total system with final achievable objectives which enhance that portion of the total instructional function. An example of this effort is in the design of curriculum experiences. Foreign language in California became mandatory in the sixth grade. A curriculum was developed to give students the experience necessary to satisfy this requirement. Concurrently, commercial producers were developing "sub-systems" of media to incorporate into this curriculum: the Encyclopaedia Britannica Spanish Program and the D. C. Heath Spanish and Parlons Francais French Programs. Other materials were supplementary, but the above were "complete" teaching programs to help fill the instructional requirement and assist in the training of classroom teachers.

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[3] The term "educational" is used to denote the interaction between teacher and student for cognitive attainment in the higher intellectual processes. These higher level skills, in part, are dependent upon the student's acquisition of basic facts.

[4] Acquisition of factual data, skills, and procedures are more efficiently acquired through mediated instruction.

[5] Robert Heinich, "The Systems Engineering of Education II: Application of Systems Thinking to Instruction," *Instructional Technology and Media Project*, (University of Southern California, Los Angeles, 1965), 37.

The introduction of these new programs, new media, and new equipment often causes initial confusion and some hostility. The teachers are confronted with increasing logistical problems. When superimposing the introduction of new media over the increasing demand for individualized instruction, it becomes apparent that logistics decisions by the teacher exceed his human capacity by several times.[6]

A study of the relevant literature indicated no systematic procedures were incorporated in any center toward the solution of the problems in a center as outlined in Chapter I. Concerns of media specialists have conventionally focused on certain isolated procedures such as booking, ordering, and film handling. To accomplish a total system study, prior to embarking on probable solutions, it was necessary to gain some understanding of systems, systems design (approach), systems analysis, and the relevancy of systems procedure to the problem. Further, the complex interrelationships of functions in a media center make it imperative that a total analysis be completed. This paper, however, does not make an effort to apply systems engineering and complex mathematical models to the problem. The "higher" complexities of engineering and technology must, of necessity, be the responsibility of those professionally trained as systems engineers.

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[6] Bruce Moncreiff, "Data Processing," *Audiovisual Instruction*, VIII, No. 8 (October, 1963), 565.

> The systems approach offers educators a logical technique for analyzing, coordinating, and controlling the complex of interrelated factors which contribute to the output.[7]

Goldberg's definition establishes the seemingly insurmountable task of approaching the total educational structure. Montgomery states that "a system is a set of parts dynamically interrelated."[8] Another writer states,

> A system is the structure or organization of an orderly whole, clearly showing the interrelationship of the parts to each other and the whole itself.[9]

Silvern's concept of system defines the necessary interrelatedness of system design, including the specific reference to feedback.

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[7] A. L. Goldberg, "First Steps in the Systems Approach," *Audiovisual Instruction*, X, No. 5 (May, 1965), 382-3.

[8] E. B. Montgomery, "Reply to Questions About Systems," *Ibid.*, 366-70.

[9] L. C. Silvern, *Ibid.*

> The systems approach is not just a collection of hardware - it is much more. It is a social activity involving people, ideas, methods, machines, communications, and various interacting systems. But always it comes back to people.[10]

The increased introduction of technology in education results in Schure's concern for dehumanization of the teaching-learning process. Schure develops his approach to a system by reminding the reader that people within a social context must be recognized. This is as it should be; education is a process which deals primarily with people.

The people must utilize their precious time with maximum efficiency if the lost opportunities of which Churchman writes are to be minimized. It is precisely this concern that has guided the writer in the direction of introducing an automated media system, which will hopefully relieve the teacher of the seemingly useless physical labor which normally is an adjunct to the use of films in a classroom.

Schure continues:

> Without the application of sophisticated technology, it is difficult to see how the teachers of today will be able to lead each student to explore, to learn, to evaluate, and to master prodigious quantities of evolving knowledge. The purpose of introducing technology into education is to come up with an efficient, meaningful division of labor between men and machines, subject to the rational control of the human being.[11]

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[10] Alexander Schure, "Educational Escalation Through Systems Analysis," *Ibid.*, 371-7.

[11] *Ibid.*

This brief examination illustrates the differing viewpoints of systems. Nevertheless, despite the difficulties in defining this term precisely, the writer will assume that the term "system" must encompass the following elements: there must be an interrelationship of the subparts to each other and the whole; the system must not overlook consideration of social ramifications; and there must be a feedback loop in the man-machine interface.

Guided by the above parameters, one must yet establish the philosophies of systems development. Churchman describes two such philosophies: (1) The thinker begins with the simple parts, understands them thoroughly, perfects them if he can, and then begins building the parts together into an edifice that eventually becomes the entire structure. (2) We must begin with the concept of the whole; otherwise we shall never know how to identify the parts, much less how to improve them.[12]

It is possible to assume these two philosophies as forming a basis for a process. The process is called anasynthesis by one systems engineer;[13] that is the application of analysis and synthesis to an instructional system.

It would be difficult to develop a rationale for the proposed design without the analytic approach of systems study to the problem. Therefore, this writer has attempted to apply analysis and synthesis to the objectives of the study. Education is sufficiently complex so that instructional designers must develop sub-systems[14] which may eventually contribute to the total system.

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[12] Churchman, *loc. cit.*

[13] Silvern, *loc. cit.*

Review of Research

The review of literature and research covered primarily those systems dedicated to individualized instruction, including the use of projection materials. However, the study directs itself at a specific sub-system of the total education "system," a sub-system which will provide new dimensions to the educator in the use of film media.

The purpose for which this study directs itself, at the indicated segment of the system, is due to the lack of research in developing total sub-systems for media centers; and that research which is going on is limited to some very specific functions within the total operation of a typical center.

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[14] Any total system is made up of smaller parts known as a sub-system which, in turn, themselves are made up of smaller parts known as sub-sub-systems which, in turn, ad infinitum - until there can be no further decomposition of system into the sub-system. However, in the context of this paper, to prevent confusion, the term "system" will refer to either "total system" or any part (or sub-system) of the total system.

Use of Computers in Educational Media

> Our task today is to make the genuine goods derived from the automation of knowledge subservient to the superior history-laden functions and purposes of human culture.[15]

The Articulated Instructional Media (AIM) Program is a four-year experiment in higher education. The purposes of the University of Wisconsin experiment are directed toward: (1) expanding the benefits of higher education to the students unable to attend the university; and (2) ease the increasing burdens of resident instruction.[16] The significant outcomes of the AIM project are the involvement of university faculty in the analysis of particular courses using a learning systems approach and the conversion and redevelopment of courses consistent with specific terminal objectives. (Appendix A1)

Stewart justifies his approach by stating,

> It is not enough just to describe the learning systems concept and to suggest its benefits. It is necessary to describe the implementation of this systems approach in a course development project through a flow diagram which indicates the sequence of events.[17]

Project ULTRA (Unlimited Training For All) at the New York Institute of Technology, funded by the Carnegie

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[15] Lewis Mumford, "The Automation of Knowledge," *Audio Visual Communication Review*, XII, No. 3 (Fall, 1964), 261-76.

[16] D. K. Stewart, "The Articulated Instructional Media Program at the University of Wisconsin," *Audiovisual Instruction*, X, No. 5 (May, 1965), 381.

[17] *Ibid.*

Corporation, has as its objective to develop a model system for the education of engineering technicians. The fundamental objective stated by Schure indicates a strong orientation to programmed instruction. ULTRA's goal is,

> The organization of attainable pathways by means of which each individual may expect a high probability of realizing the predicted match of his potential with the occupational and school inventory.[18]

Data collected during interviews and tests about the student are compiled and information is stored, analyzed, and retrieved using computers. The resulting profile, using the student's instructional inventory and his potential, must match his career potential. This provides the means for the student to be directed toward an interest goal, with a high probability of attainment.[19]

The development of a multimedia system requires considerable planning and a pre-programmed curriculum which integrates many sources of media. Included in the Southern Connecticut State College system are open and closed circuit television (videotape recordings), films, slides, filmstrips, and lecture materials.[20] This multimedia system offers the instructor an opportunity to coordinate the curriculum plans for his course with media personnel.

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[18] Schure, *loc. cit.*

[19] *Ibid.*

[20] H. C. Buley, "Multimedia Systems of Instruction," *Audiovisual Instruction*, X, No. 5 (May, 1965), 391-2.

Production and preparation of appropriate media for the system offer the curriculum team an opportunity to program the course and introduce a dynamic innovation in teaching.

Possibly the most appropriate educational design to this study is the "multimedia" project at System Development Corporation. The experimental Computer-Based Laboratory for Automated School System (CLASS) incorporates the computer time sharing capability to activate mediated experiences from television, films, or audio tape lectures.[21] The program is designed so that students respond individually to problems posed for the entire group. The displays generated in the CLASS originate with the conventional audiovisual equipment.

The programmed Logic for Automatic Teaching Operation (PLATO) project is similar to CLASS. It, however, instructs two students simultaneously. CLASS is designed for twenty students with capability for expansion. PLATO incorporates the use of slides, television, and a student response panel.[22] (Appendix A2)

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[21] Donald Bushnell, "Computer Assisted Instruction: A Summary of Research Programs," *Automated Education Handbook*, Automated Education Center, (Detroit, Michigan, 1965), 41-55.

[22] Donald Bitzer, Elisabeth Lyman, and John Easley, "The Uses of PLATO: A Computer Controlled Teaching System," *Audiovisual Instruction*, No. 1 (January, 1966), 16-21.

The use of the computer will assist the educator in realizing the goal of individualizing instruction.[23] In the Brentwood Elementary School, East Palo Alto, California, Suppes and Atkinson use the speed, storage, and logical capabilities of the computer to provide individualized computer assisted instruction (CAI) in Reading and Arithmetic.[24] Professor Suppes' CAI system has made it possible to modify its operation on the basis of information fed into it and to act on elements of response, not just the entire response. The CAI system provides a typewriter keyboard on which a child can press keys and almost instantaneously observe the response. He can also use the "light sensing" pen which communicates with the computer through the face of the cathode ray tube on contact.[25] The system incorporates film, television images, and tape recordings for audio and video display. A similar program has been implemented at Yorktown Heights, New York.[26]

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[23] Patrick Suppes, "The Computer and Excellence," *Saturday Review*, (January 14, 1967), 46-50.

[24] International Business Machines Corporation, *Annual Report for the Year Ending December 31, 1966*, (1966), 40.

[25] *Ibid.*

[26] Thomas F. Hartman, "Computer Assisted Instruction," *Audiovisual Instruction*, No. 11 (January, 1966), 22-3.

Direct Access Systems

Recent technological developments for instruction are advancing toward use of direct access systems. The retrieval of data which is pre-recorded (pre-stored) is possible through multiple channel systems carrying audio signals and in some cases audio and video signals. Several systems currently exist and are at various levels of development. Three systems described are best noted by the author because of study and personal visits. It is to these systems that the comments which follow are addressed.

The audio dial access system at Oklahoma Christian College[27] is an audio system controlled by a central computer which switches programs on as they are dialed by students in carrells. All equipment is located in the same building. Using telephone type dialing, students are able to retrieve any one of the hundred audio programs. The programs are played back on multiple track tape recorders. Over twenty-five machines are necessary to provide this "random and immediate" retrieval. Following the playback, the tape is automatically rewound through the cross-bar switching mechanism of the computer control unit. Thirty-six additional channels are used to provide scheduled programs which are either required study and/or popular.

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[27] Ross Stafford North, "Mediated Instruction by Remote Access," *Seminar on Remote Access Systems: Audio/ Video Retrieval* (Oklahoma: Oklahoma Christian College, September, 1967).

Students rent carrells each semester. This policy provides a personal space which is assigned for each student's use. The carrell is equipped with the telephone dial, a head set for listening, storage space, and sufficient space for using 8mm single concept (cartridge load) films. Since the carrells are leased by students, they are at liberty to use the carrells for study. This tends to relieve the crowded conditions of the library. The personalization as evidenced in the lease plan is demonstrated by the decor of each carrell. It is possible that the accouterments, attached by the student to his carrell, provide high personal associations which increase his motivation for study at his carrell.

From observations and discussions, one may conclude that the audio-system used at Oklahoma Christian College has been able, to a certain extent, to replace the lecturer. This may be sufficient justification for establishing the goal of achieving one carrell per enrolled student. The remote system is also used to "get caught-up" on lectures which students miss. Making up lectures, in fact, seemed to be the most desirable characteristic of the system. Upon questioning students, this writer found that the freedom which was provided in "rerunning" a lecture which they missed indicated the potential for eliminating the formal classroom lecture approach.

To provide additional assistance to the student in acquiring significant learning experiences, many audio programs were accompanied by worksheets. The directions and activities for the worksheets emanated from the taped program. The worksheet provided a modified programmed instruction format, permitting active student responses rather than a passive listening experience. The students who were viewed during study periods in the carrells also demonstrated active responses through note taking.

The sum total of the Oklahoma Christian College endeavor is to provide audio material which may eliminate classroom lectures (allowing for more student-teacher interaction); or to supplement the classroom material through repetition and extension of concepts covered in class.

A dial access audio-video system is in operation at Oral Roberts University, Oklahoma.[29] The audio storage system operates in a similar pattern as at Oklahoma Christian College. Audio tape transports, equipped with a photo sensing mechanism, permits automatic recycling at the end of the program. Two radio tuners are included in the system for broadcast. The video storage includes three quadruplex video tape machines, six film chains. Complete audio and video production facilities are located adjoining the central storage-retrieval unit.

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[29] Paul I. McClendon, "Dial Access Audio-Video System," *Seminar on Remote Access Systems: Audio/Video Retrieval*, Oklahoma Christian College, (September, 1967).

The production facilities are comprised of a television studio, audio production equipment, a master control unit, stereo equipment, and quadruplex videotape machines. Other production aids, such as an audio and video programmer which allows for integrating units of material in a programmed sequence and a science laboratory connected to the audio and video system for "close-up" demonstrations, are part of the production capability of the system.

Distribution of stored materials to the one hundred and thirty remote stations located in the Learning Resources Center includes classroom complexes, audio-video carrells in the library, and similar carrells in both the Learning Laboratory and Language Laboratory. Video distribution is used in all locations.

Retrieval is achieved through a computer control system with cross-bar audio and solid state video switching matrices which are interconnected between source materials and equipment to the station in response to a digital dialed code.

Two other significant experimental programs which are using dial access systems in California are located at the Sacramento Unified School District (Will C. Wood Junior High School), and the Beverly Hills Unified School District. Both are directed toward optimizing learning experiences for individual students. In the Sacramento plan, access capability is provided through a dial-up system to retrieve audio and video material. The hardware configuration includes motion picture projectors, portable videotape recorders, slide-filmstrip projectors, and audio tapes. To provide the software for these systems, the project director has arranged with commercial producers for the use of their films, filmstrips, and other media. Included in the facility is a small production studio where audio and video tapes are planned and produced. Production of programs is accomplished by the teaching staff. These are classroom teachers selected because of their particular subject skills. They are responsible for converting their lessons to a mediated format. Other than "central office" curriculum planning specialists, the teachers are responsible for the total production effort. Additionally, a project director and an engineer-graphics specialist assists as back-up for the teachers as part of the production team.

The significance of this effort revolves about the system capability for (1) individualizing instruction, and (2) integrating media or using the multi-media approach to instruction. A variety of media, including print media, are available for student use. The media is accessed by dialing direct from student carrells. The program is distributed through a closed circuit television system to the student viewing station.

Through visitations and discussions relative to the three programs described above (See Chapter IV for description of the Beverly Hills system), one common problem emerged: the need for more instructional media "to feed" the system. The financial ability of the center to provide more materials has not kept pace with its ability to acquire hardware.

Hartjen[29] describes two problems which are relevant to the development of direct dial systems: (1) there is absolutely no reference to research to determine the feasibility of the concept or its pedagogical soundness; and (2) there appears to be no sound rationale to support dial access. The problems may appear because of the lack of planning for a feasible system.

The Sacramento program is an experiment funded through state support (McAteer Act) to determine the feasibility of the dial access system for the school's (deprived) student population. The program is in its first year of operation, at this writing, and will be under study for three years. A full-time researcher is assigned to maintain research procedures for assessing the effectiveness of the program. The project director already claims a higher motivation by students who are using the system than they displayed in the conventional classroom environment.

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[29] R. H. Hartjen, "Is Dial Access of Stored Audio a Behaviorally Sound Student Interface?" *Unpublished Master's Paper*, University of Pittsburg, (April, 1967) (Mimeographed), 22.

Automated Cataloging Project*

The project centered at the University of Southern California was funded under a grant from the Department of Health, Education and Welfare, United States Office of Education, National Defense Education Act, Titles III and VII.[30] McMurry was concerned with the storage and retrieval of information about films. The function of dissemination of information about instructional materials seems to be the most easily accomplished of the functions of a media center. However, timely dissemination of new titles is still a problem to be overcome.

The University of Southern California project was designed to establish a notation service which will provide media centers a complete list of all audiovisual materials in catalog form for use in:

a) Cataloging new materials which have been purchased by the media center.

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*Now the National Information Center for Educational Media (NICEM).

[30] Glenn McMurry, *Southern California Automated Cataloging Project*, Final Report to United States Department of Health, Education and Welfare, Contract No. OE4-16-031 (June, 1967), 14.

b) Selecting new materials for preview and evaluation.

c) Disseminating information about new materials.

The cataloging project further developed a procedure for feeding into the system all materials which existed in catalogs of media centers in Southern California.

The research in this project provided additional insight in the use of computers, and how they can be effectively employed to store massive amounts of data and allow retrieval of any particular media title in relatively short periods of time.

The objective of the project was the development of a centralized data storage and retrieval system for media catalog production. This cataloging service has the potential of virtually eliminating duplication in data storage, data retrieval, catalog production, and decreasing lag time between the processing of data and the dissemination of the data to the consumer.

The project staff developed standards and presented them for study. Revisions were accepted and presented at a meeting of audiovisual leaders in San Francisco, California. A formal adoption of the standards resulted in the publication, "Guidelines to Audio Visual Cataloging."[31]

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[31] Nichols, *loc. cit.*

Operational procedures for conversion to the NICEM system were incorporated following adoption of the standards for input and output at the state meeting. Improvements in the "modus operandi" continue to be made, but the basic design of the system is unchanged.

Once the media specialist determines the need for conversion to the NICEM system, he must provide a master list of his holdings, it is checked and edited to match the stored data. All listings are corrected and new titles (those not in computer storage) are processed. The processing of new titles includes research for complete data, typing "input" forms, key punching data, and merging the data into the master file.[32] A print-out (Appendix B1 and B2) of the data is provided for proofing and further editing. A format is established for the final print-out. The final print-out is ready for photo-offset copy and reproduction. The computer program is designed to allow for double column-alphabetized copy with page numbers.

Three types of print-out are supplied for catalog production[33] (see Appendix B3, B4, and B5): (1) alphabetical lists, (2) subject category listing, and (3) producer's code.

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[32] McMurry, *loc. cit.*

[33] *Ibid.*

The system continues to undergo change, but when the process was submitted to a Program Evaluation Review Technique (PERT)[34] analysis, a total of 8.8 weeks were computed for completion of a catalog (from the time of order to delivery from the printer to center). This was an improvement over conventional systems. However, of this 8.8 weeks, only four hours of electronic data processing time was expended, which included programming, key punching (additional data beyond stored records), and print-out. Should further standardization be accepted, which will eliminate special handling at each center, the entire process of cataloging could conceivably take only a few weeks.

Although the NICEM project is a step in the right direction, it nevertheless fails to use the computing power to its full capability as evidenced by the long elapsed time (8.8 weeks) for the total cycle. The proposed system in this project by-passes the observed deficiencies as described in the PERT (Appendix B6) network, while retaining the best features of the system. The data on the film media which has been stored will reduce the work load when conversion to the proposed system becomes possible.

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[34] Charles J. Vento, "PERTing the Automated Catalog," *Audiovisual Instruction*, XI, No. 3 (March, 1966), 182-5.

Anderak,[35] in the preface to his report, describes his purposes for a television distribution system: (1) direct instruction, (2) transmitting instructional materials, and (3) fulfilling administrative input-storage-retrieval requirements of a group of neighboring public school districts in a large urban-suburban area. The study was an investigation into the feasibility of an arrangement of hardware. The logistical system is designed to replace the schedule, multiple print, time lag, and print damage problems.

Anderak's system may be considered as a data delivery vehicle which satisfies an administrative function. The problems of utilization are vastly more complex (refer to Chapter I). It is intended that the proposal described in Chapter IV will allow for broader logistics of instruction directed by the teacher.

Use of Computers in Other Related Areas

Significant projects outside of the educational community which are relevant to this study have also been identified. The Medical Literature Analysis and Retrieval System (MEDLARS) was designed to establish a storage and retrieval program for information on the medical sciences. The objectives of MEDLARS are stated on the next page.

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[35] Anderak, *et al.*, *loc. cit.*

1) A rapid dissemination of lists of current publications in the medical field. *Index Medicus* is a monthly bulletin published from the storage and retrieval system.
2) A means of bibliographic control of medical periodical literature as a data base from which other libraries may retrieve information for its use.[36]

The system which was developed to assist in the MEDLARS publication program was the Graphic Arts Composing Equipment (GRACE). This enabled the automation necessary to convert computer output into high quality photocopy for publication. GRACE is controlled by a computer console through a photocomposing flash tube matrix.

The total MEDLARS program incorporates three components: (a) input, (b) retrieval, and (c) publication. The development of automated procedures for the instructional materials center, as in MEDLARS, essentially involves the input and output of data, a function which recognizes the appropriate man-machine interface. That is, functions easily accomplished by machines are functions which may be programmed for machine operation. Current practices in media centers demonstrate the need for automation to accomplish the proper balance between humans and machines. With the advent of large-scale computers and the availability of relatively fast core speeds, the era of computer time-sharing is upon us and the adoption of this mode of computer usage can effect substantial cost savings for the school systems.

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[36] Martin M. Cummings, "Health Sciences (MEDLARS)," in *Electronic Information Handling* (Washington, D. C.: Spartan Books, Inc., 1965), 355.

The financial and personnel effectiveness of converting to computers is exemplified in the air transport industry. Each airline ticket counter has electronic input-output devices[37] which can communicate directly with a large IBM computer system in a central location. The reservations clerk may request space on a flight and receive an instantaneous response, either confirming the space or suggesting alternate flights. Before take-off, the computer supplies data for planning meals, beverages, and other supplies necessary for the number of people on the flight. It is certainly possible that some of the same concepts used in the SABRE system could provide a powerful starting point in developing a similar system for booking motion pictures.

Summary

Increasing activity toward automating portions of the instructional process are evidenced by the search of the literature. Although the review is not exhaustive, it does provide a cross-section of the many projects which have been established throughout the country.

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[37] E. W. Martin, Jr., *Electronic Data Processing* (Homewood, Illinois: Richard Irwin, Inc., 1965), 561.

An understanding of the concept of "system" was necessary prior to the definition of requirements for automation. Several definitions of the systems concept were explored for clarification.

Many projects, experimental and operational were studied and reviewed. Personal visitations provided a clearer "global" awareness of several programs which were described in detail. Three different types of programs were reviewed.

1) Instructional systems which incorporated multi-media systems and some computer control arrangement; included in this category is Computer Assisted Instruction, such as the Suppes experiment at Stanford University.
2) Some efforts are being directed toward automating procedures within the media center. The NICEM catalog project, and direct dial systems in several locations were visited. These visitations provided a background for establishing a total computer controlled process.
3) Automated systems outside of education such as MEDLARS and SABRE seemed appropriate to the

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study. These were described to offer readers additional insight into system solutions which may be applicable to the system herein proposed.

CHAPTER III

THE STUDY APPROACH

> An important focal point for the teaching profession now is the humanization of the means of instruction. We have reiterated truly human ends for education but have not done too well by the means. Two opportunities lie open to us. The first is the humanization of content. The second is the humanization of the entire instructional environment.[1]

The Interview

The research study was designed primarily to employ the interview technique. The initial interviews established gross understandings of the problems in a media center and provided an overview of the present operations. Following these initial contacts, an analysis of the data collected provided information which served to focus questions into specific areas. The focused interview, which followed, provided specific data for analysis and the development of a functional flow chart illustrating the present center. The information was used to correct the overall analysis to the satisfaction of administrators. This data demonstrated the possibilities of converting present clerical operations to automated procedures (see Chapters II, IV, and V).

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[1] Goodlad, *loc. cit.*

The concurrent literature review was used to establish a theoretical framework of the proposed system as compared to conventional procedures and with other systems under development. A final review of the current operation and the proposed system requirement with the original respondents was completed to insure that the objectives of the proposed system satisfied the defined objectives of the study.

The interview as a research technique is unique in that it involves the collection of data through direct contact.[2] Person-to-person interaction provides the flexibility to adapt to the interview responses, thereby allowing the interviewer an opportunity to focus on questions based on responses. The stimulus for seeking pertinent data, then, is the response. The interviewer is able to follow-up leads which may be pertinent to the interaction between departments, or individuals. An example of this function of the interview was the ability of the interviewer to follow-up on gathered data. Initial interviews were always with the administrator in charge of the center. He was able to provide a broad, but somewhat cursory, description of the system. Borg lists[3] the advantages of the interview techniques as permitting the following:

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[2] Walter R. Borg, *Educational Research: An Introduction* (David McKay Company, Inc., 1963), 221-33.

[3] *Ibid.*

- greater depth.
- follow-up leads to obtain more complete data.
- the establishment and maintenance of the proper rapport of respondents.
- a means of checking and assuring effective communication.

In this particular study an additional advantage was relevant to the research procedure. Interviews permitted a confirmation of verbal data with actual functions as the personnel worked. The interviewer was able to gain knowledge of the processes, especially when specificity was required.

The interview procedure was necessary to establish the criteria for defining a system implementing data processing techniques. The data extracted in this study necessitated a detailed evaluation of each step in the total conventional process. Acquisition of data for the study, therefore, necessitated two types of interviews: (1) non-directive, and (2) focused.

Non-Directive Interview

The initial stages of the study were implemented to provide a gross view of the media centers. To allow sufficient latitude in the interview, the interviewer provided respondents with an explanation of the purposes and objectives of the study (see Chapter I). Invariably, this initial encounter generated sufficient interest to provide free discussion about the potential of improving media center services through automated procedures. The purpose of using the unstructured interview was to obtain information from respondents which could not be elicited through a questionnaire or structured interview.

The success of the unstructured interview is determined by the skill and experience of the interviewer in acquiring the subjective data necessary for eliciting evaluative responses. However, lack of structure in this method, presents opportunity for the interviewer to inject bias, thereby consciously or sub-consciously distorting the results. To avoid distortion, the interviewer catagorized the responses which formed the basis for an outline of the functions, i. e., booking, cataloging, distribution, evaluation, purchasing, repair, and maintenance. Sub-points were listed as reminders to the interviewer for discussions with the individual responsible, i. e., (1) booking - use of order forms, wheeldex operation, school coding, and (2) cataloging - subject, grade, tab codes, addressograph system. The process of catagorizing the data eliminated any probable confusion in recording the information, thereby establishing content validity. Because media center operations are technical, the non-directive interview seemed sufficiently objective for preliminary reliable results.

The Focused Interview

The major portion of this study was performed through the focused interview. The investigator considered this method to be the most appropriate because a detailed analysis of media center functions was required for an in-depth investigation.

A distinguishing characteristic of the focused interview is that respondents are exposed to specific questions.[4] However, a danger in using specific questions, as Borg points out, may be in the way they are framed.[5] It is possible that a question may lead the respondent to provide an alternate answer. This could bias the interview and possibly affect the rapport.

The focused interview is more than acquiring general replies to a series of questions. It requires the interviewer to establish an interpersonal relationship, planned to accomplish particular objectives. Concrete experiences of each staff member became the focus of attention with which the interviewer was concerned. Many operations considered insignificant by the personnel in the media centers, because of their experiences resulting in mechanical processes analogous to habits, were revealed to the investigator.

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[4] Robert K. Merton, Marjorie Fiske, and Patricia Kendal, "The Interview - A Manual," Bureau of Applied Social Research (New York: Columbia University, September, 1952), 202.

[5] Borg, *op. cit.*, 228-9.

After a complete outline of functions in the center was completed, the focused interview was employed with every member of the center. Each function was discussed as outlined; the person responsible for the particular function made suggestions for corrections; and a final interview with the director confirmed or further clarified the data collected.

Because the interviewer had personal acquaintances with the operations, as well as the personnel, through past associations, the collection of needed information was enhanced. The rapport seemed positive and did not reflect any problematical situations which might possibly bias the interviews.

Interviews were conducted with all personnel directly involved in operations of the center, including:

Administration - needs and objectives of the service and the current general pattern of operations were discussed.

Reception - the interview was concerned with how orders are received (mail, personal call, and delivery truck) and processed to the appropriate stations for booking.

Booking - the wheeldex is most commonly used for the booking system. Cards are typed with data about the media, bookings are made on the calendar portion of the card, tallies are kept on unfilled orders, and invoices completed.

Shipping - shipping invoices are received, materials are withdrawn from storage, and prepared for shipment.

Distribution - the truck delivery personnel maintained control of deliveries through shipping invoices, delivery to schools, pick-up materials to be returned to the center, and checking materials prior to processing for refiling.

Maintenance - media is checked, repaired, and cleaned before they are returned to storage.

Cataloging - the current practice of cataloging involves considerable manual processing. Addressograph, mimeo, and other semi-automated systems are used. Detailed descriptions of cataloging systems are included in Chapters II and IV.

System Synthesis

To provide a graphic representation of the major steps of the media center work in progress, the process flow-chart was employed. The necessity for an orderly representation makes it imperative to visualize the information flow. The sequences for the process are precise, therefore, allowing the reader a comprehensible method of following the flow of data through all parts of the system.

The different graphic symbols, employed in a flow chart, represent documents, machines, logical decisions or actions taken during the process.[6] Thus, the purpose of flow charting is to establish who does what, and at what point, in a given cycle, rather than to establish how a given work package is to be accomplished. A first draft flow-chart was prepared and reviewed with personnel in the centers. This allowed the respondents an opportunity to see a visual representation of their descriptions. Following the final discussions regarding the operations flow diagram, a final representation was prepared.

The Present System

In synthesizing the present system, it was necessary to interconnect the different sub-systems which cohesively depict all the common processes performed in a media center. This synthesis provided a point of reference which was required to achieve the objectives for the proposed system.[7]

> The ultimate goal of any system is to achieve maximum internal operating efficiency of the elements of the system. A system must help a manager to plan, organize,

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[6] International Business Machines Corporation Data Processing Techniques, "Flow Charting Techniques," C20 - 8152 (White Plains, New York: Publications Department, International Business Machines Corporation).

[7] C. H. Springer, "Techniques and Costs II, The Systems Approach," *Saturday Review*, (January 14, 1967), 56-7.

> staff, direct, and control the resources available to him to achieve a set of objectives.[8]

The two major factors of system procedures, analysis and synthesis, were imperative in accomplishing a thorough study of the existing media centers. This approach to the study corroborated data input-output needs between the teacher and the media service center. Because the information requirements were necessary in the development of a new system, the achievement of the analysis and synthesis provided the design specifications for the proposed system.

The Proposed System

To define the new system requirements, it was necessary to identify entities or elements which receive certain inputs and are constrained to act concertedly upon them to produce certain outputs.[9] Attention was focused upon specific functions in synthesizing the proposed system. Specificity in delineating the functions provided for the identification of existing problems and deficiencies within the specified function. The delineation of the requirements, therefore, was possible for each function. An approach to the determination of requirements to the problem solution within each sub-system was necessary. Prior to identifying an approach to possible solutions, a study and knowledge of the "state-of-the-art" was required. The capabilities of present hardware systems were considered in the context of probability to school design and cost structures. A review of different visual display systems,[10] discussions with systems engineers in the computer industry, and television (electronic) engineers allowed for a status report on possible distribution-display storage and retrieval systems. It was also recognized that the "system of the future" would incorporate radical changes which may include satellite, laser beam, and other communications systems[11,12] which presently are not entirely feasible. The perpetration of the "futuristic communications" system would render an immediate solution impossible. Therefore, the proposed system is based on present hardware capability.

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[8] W. R. Tracey, E. B. Flynn, Jr., and J. Legere, "Systems Approach Gets Results," *Training in Business and Industry*, IV, No. 6 (June, 1967), 17.

[9] R. B. Kershner, "A Survey of Systems Engineering Tools and Techniques," in *Operational Research and Systems Engineering*, C. D. Flagle, W. H. Huggins, and R. H. Roy, (Baltimore, Maryland: Johns Hopkins Press, 1960), 899.

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[10] Compendium of Visual Displays, *Rome Air Development Center*, 2nd Ed. Revision (New York: Research and Technology Division, Air Force Systems Command, United States Air Force, Griffins Air Force Base, 1967), 661.

[11] Donald D. Bushnell, "Role of Computers in Future Instructional Systems," *Audio Visual Communication Review*, II, No. 2 (March-April, 1963), 70.

[12] Public Policy Issues - Reply Comments of the Ford Foundation Before the Federal Communications Commission (In the matter of the establishment of domestic communication satellite facilities by non-government entities), (Washington, D. C.: December 12, 1966), I, No. 16495, 15.

The next function to be performed in the development of the proposed system was to process-chart the approach. Each of the above steps was required for the definition of each sub-system. The interconnection of each sub-system produced the integrated system (see Chapter V).

Frequently, the process-flow chart needed modification during the interfacing phase of the sub-system with the whole system. The final procedure was to make these changes, thus creating an integrated system in which the different sub-systems mesh, or interface, with each other. Throughout this entire synthesis, it was necessary to gradually build, in phases, toward the overall system. This requirement dictated certain considerations to be taken in the development of the procedures as discussed above. Bushnell[13] provided a series of questions which are relevant to the system synthesis:

- Who provides what information to whom?
- What are the system requirements?
- What are the reporting practices?
- What parts of the total system are affected by the different actions taken by other parts?
- What functions should be automated?
- What should be left as currently performed?

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[13] Donald D. Bushnell, and John F. Cogswell, "A Computer-Based Laboratory for Automation in School Systems," *Audio Visual Communication Review*, IX, No. 4 (July-August, 1961), 68-9.

The Questionnaire

The acquisition of a statistical profile of selected centers necessitated the development of a questionnaire (Appendix C1). The questionnaire is an instrument widely applied by educational researchers to obtain facts about current conditions and practices. For this study, it seemed to be the only practical device for allowing the respondents to provide needed information to verify certain operational practices.

A mailed questionnaire was employed in this study in order to reach many people in the entire state at a relatively low cost. However, a disadvantage in using a mailed questionnaire is the probability of the lack of a 100 percent return. The lack of sufficient returns may affect the results of the findings. Reasons for the non-response may vary (Godfrey[14] was plagued by the problem in her national survey). However, the great mass of literature competing for the recipient's attention poses a formidable problem of which the writer was aware.

Problems in formulation and utilization of questionnaires may invalidate certain items and affect conclusions. Misinterpretation of written items in a questionnaire produces inconsistency of response. Should the conclusions be dependent upon every item used in the questionnaire, precise interpretation is a requirement. Therefore, the researcher must be exact in item construction, assuming dependable communication to and interpretation by the respondent.

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[14] Godfrey, *loc. cit.*

The questionnaire for this study was designed to show data pertinent to the overall cost structure and to develop a statistical profile of the centers. Questions regarding personnel, inventory of films, travel, and budget were to serve the purpose of indicating the magnitude of the services performed by the centers.

The survey instrument was mailed to fifty county instructional media centers in California. Administrators who had not returned the questionnaire within four weeks were contacted by letter. A satisfactory response resulted from the follow-up.

Formation of Rationale

A prerequisite to defining the requirements for automating operations of media centers was the review of additional literature. This supplemental study was basic to the formation of a rationale for an automated system.

The paucity of available research, as discussed in Chapter II, is matched by a similar condition in the literature relating to methods of overcoming problems in providing a total effective media service to the teacher. Present literature is descriptive of existing systems and their relationship to the educational structure. For descriptions of these processes (sub-systems), the reader is referred to the following: issues of *Audiovisual Instruction* for January, February, April, and October, 1967; James W. Brown and Kenneth D. Norberg, *Administering Educational Media*, McGraw-Hill Book Company, 1965; J. C. R. Licklider, *Libraries of the Future*, Massachusetts Institute of Technology Press, 1965; and B. E. Markuson (ed.), *Libraries and Automation*, Proceedings of the Conference on Libraries and Automation at Warrenton, Virginia, May, 1963. (Additional literature exists relative to the administrative functions of a media center, however, the above listed are the latest pertinent materials.)

Software requirements for cataloging and distributing functions in the proposed system seem academic. The computer service center will provide the necessary functions of management, systems and procedures analysis, programming, and machines and keypunch operations.[15] Computer programs which are created to generate graphic displays, including three-dimensional facsimiles, offer the alternative to book style catalogs.[16]

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[15] K. W. Draeger, "Organizing a Computer Service Center to Supply Employee Motivation," *Data Processing Magazine*, VII, No. 11 (November, 1965), 30.

[16] *Computers and Automation*, XIV, No. 11 (November, 1965), entire issue.

Relative to display systems, Teichroew[17] writes of a greater function than mere control:

> The control function by itself does not appear a promising application for display devices. An application with more potential is the planning function, where manager-computer communication using display devices may prove not only feasible but actually necessary.

Teichroew writes of future computer potential in saving design engineer planning time through the use of a special pencil to mark specifications on a special surface. This data would be processed through a computer which will develop the necessary system characteristics. The development of the "self-generating" system may provide the requirement for progressive improvement for the proposed system in this study. Computer technology continues to develop at a rapid pace. Improvements suggesting answers relevant to the proposed system at this writing may, of necessity, be different at the implementation stage.

A commitment to convert the present system, therefore, is necessary. Presently, media administrators attempt systems solutions for portions of the total problem. Improvements are provided for in the media centers through partial corrective measures. The goal of more effective use of materials is frequently a secondary thought - if considered at all.

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[17] Daniel Teichroew, "Information Systems in Information Display," *Information Display*, II, No. 6 (November-December, 1965), 35.

Assigning equipment and materials upon request (booking system) has been the first process, reportedly, converted to automation. Gerletti[18] describes his efforts to introduce computer processing techniques into the booking process. A need existed, in the largest media center in California, for the development of a system to automate the massive booking needs of the center. Currently, the software (computer programs) are being created with built-in design flexibility for future on-line interconnection. Different systems are reported[19,20,21] for equipment and materials information controls. The solutions are partial answers to the automation-cybernation system required to provide effective utilization of media in the classroom.

Cataloging has reached a first plateau of development by the use of computer technology.[22] Catalogs have been produced by the addressograph system,[23] with the use of the pre-punched tab (IBM) cards, and reproduced on a reader-printer system.[24] The UNIVAC system and the Friden (United States Medical Facility, Atlanta, Georgia) were used. However, each of these systems was a partial answer to the need for automating certain procedures. Detailed descriptions, pertinent to the study, are described in Chapters II and IV.

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[18] Robert C. Gerletti, "Electronic Data Processing Applied to A-V Centers," *Audiovisual Instruction*, VI, No. 10 (December, 1961), 515-17.

[19] Thomas W. Roberts, "An Efficient Film Filing System," *Educational Screen and Audiovisual Guide*, XLII, No. 3, No. 419 (March, 1963), 140-1.

[20] Carl H. Hubacheck, "Audiovisual Control Board," *Audiovisual Instruction*, VI, No. 10 (December, 1961), 519.

[21] Willima F. Lueffert, "Information Processing in Large Communications Systems: Its Applications to Dynamic Control and Counting Problems," *Dissertation Abstracts*, XXVI, No. 5 (November, 1965), 2648-9.

[22] Carolyn I. Whiteneck, "A National Catalog for A. V.," *Audiovisual Instruction*, VI, No. 10 (December, 1961), 510-11.

The emergence of a national information system, such as the Educational Research Information Center (ERIC), would contribute a common educational thesaurus for the development of a key word retrieval system. This system would make possible the search and retrieval function of research, documents, and instructional media required by teachers. Conversion to this retrieval system would enable utilization on a national or global scale:

> Commercial satellite communications are now available to more than two thirds of the world and new satellites to be launched, beginning this year, will make such service available to any country that has an Earth station.[25]

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[23] Jack Keene, "How to Cut Corners on Catalogs," *Educational Screen and Audiovisual Guide*, XL, No. 8, No. 400 (August, 1961), 394-5.

[24] Lyndon Vivrette, "We Put Our A. V. Catalog on I.B.M.," *Audiovisual Instruction*, VII, No. 5 (May, 1962), 302-3.

[25] S. H. Reiger, "Global Tete-a-tetes: A Satellite Repeating System," *Electronics World*, LXXIX, No. 2 (February, 1968), 30-1.

Achievement of an effective communications system will depend upon capabilities of computer hardware and software developments. Massive support will be necessary for linking schools and districts.[26] The emergence of standardization will be inevitable with increasing technological development.[27] Standardization will contribute to a logical order of overall systems operation,[28] rather than determine the feasibility of replacing hand operations by machine. The position of the audiovisualist indicates a need for management decisions analogous to business management[29] which subsequently contributes to overall productivity through use of media.

Possibilities for increasing standardization and automation in the media centers may emanate from the work being accomplished in the book libraries. Although the book is the least expensive method of storage and retrieval of information,[30] librarians, and systems engineers are involved in the study of relieving the glut of information in "warehouses" filed in ways which makes the process of retrieval extremely difficult. Licklider reports on a study to determine what the library of the future will be:

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[26] Donald D. Bushnell, R. deMille, and J. Purl, "The Application of Computer Technology to the Improvement of Instruction and Learning," *Educational Implications of Technological Change*, Appendix VIV of Technology and the American Economy, Superintendent of Documents (February, 1966), 150.

[27] J. P. Finn, "The Emerging Technology of Education," *Educational Implications of Technological Change*, Appendix IV, Technology and the American Economy, Superintendent of Documents (February, 1966), 150.

[28] Melvin C. Hurni, "The Logic of Automation," in *Modern Technology and Civilization: An Introduction to Human Problems in the Machine Age*, Ed. by C. R. Walher, (New York: McGraw-Hill, 1962), 469.

[29] Barry Morris, Ed., *The Function of Media in the Public Schools*, Position Paper (Washington, D. C.: National Education Association, Department of Audio-Visual Instruction, September, 1962), 8.

> The planning (for the year 2000) frees man from the constraints of the present day technology so one can concentrate on what man would like the nature of his interaction with knowledge to be.[31]

It is imperative that the problems of the library be studied:

> Books are bulky, heavy, and too expensive for universal private ownership. They circulate too slowly, as storage function they are only fair, and their retrieval is poor.[32]

The need is for convenient and easy transmission of information, without transmitting material, under specifications of the user. Large storage and retrieval systems are expensive, however, the specifications must be provided to engineers. Costs must be considered in terms of utility and markets. The Library of Congress proceedings explored the full range of problems relative to automated procedures. Close cooperation will be necessary among experts of libraries, computer graphics, and communications. The cost, therefore, will be translated in terms of service and convenience. An exploration of a library system which is automated produced the following considerations for communications criteria:[33]

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[30] Barry Morris, "Impact of Technology on the Library Building," *Educational Facilities Laboratories*, (July, 1967), 20.

[31] J. C. R. Licklider, "Libraries of the Future," *Massachusetts Institute of Technology Press* (Massachusetts, 1965), 1.

[32] *Ibid.*, 4-5.

- Message distribution (method)
- Message volume
- Urgency
- Message language
- Accuracy
- Cost

The functions were also defined as a need for:[34]

- Transmission to and from a console
- Transmission of media (digital) by tape, card, etc.
- Teletypewriting
- Telewriting
- Remote copying of graphic data
- Voice transmission
- Distance, choice, and utilization of channels

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[33] Barbara Evans Markuson, (Ed.), "Libraries and Automation," (Proceedings of the Conference on Libraries and Automation at Warrenton, Virginia, May, 1963), 20.

[34] *Ibid.*, 212.

- Amount of traffic
- Distribution of traffic

Systems engineers will be concerned with several basic principles for design and a choice of equipment. These are defined as:[35]

- Interface problems
- Data transfer
- Communications
- Terminal output devices
- Large versus small systems
- Programming
- Costs

Media specialists will easily recognize the above problems related to book libraries as applicable to their area of responsibility. The functions of processing information and media are not unlike those in the library.

Summary

The methodology for the acquisition and compilation of data was reviewed. Several approaches were required for gathering pertinent information in the analysis and synthesis of the present system, and a synthesis of the proposed system.

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[35] *Ibid.*, 237-44.

Two levels of interviews were employed: (1) the non-directive interview which allowed a generalized overview of the current "modus-operandi," followed by (2) the focused interview which was designed to gain specific data for the completion of the study leading to the definition of the current system.

A questionnaire was employed to provide a statistical description of the media centers in California. Particular emphasis was placed on five selected centers to illustrate similarities and to make comparisons relative to administration and services. To supplement the statistical analysis, the California Association of School Librarians and Audio-Visual Education Association of California standards were applied for comparisons in the effectiveness of services rendered by the county centers. Additional data was provided from the recent survey compiled by the California State Department of Education, Bureau of Audio-Visual and School Library Education.

To formulate a rationale for the proposed system, a literature search was employed throughout the study. The search, although not necessarily exhaustive, does indicate a paucity of research related to the defined requirements for this study. The literature pertaining to computers and computer technology is descriptive of service centers. Software requirements in operations primarily in business or business related functions are described in the literature. The educational society is cognizant of the use of computers, however, utilization is primarily in the fiscal needs and class scheduling problems of school systems. Research attendant to the inclusion of computers with instruction is progressively expanding.

CHAPTER IV

SYSTEM ANALYSIS

> Our greatest barrier in moving into a new plan for improving education will be our loyalty to the inadequate organizations and arrangements which exist today.
>
> If we can recognize them as being the best we could imagine when we invented them, give them full credit for what they have accomplished, and then move on to something better. . . .[1]

Findings and Results

Through the combined questionnaire and interview method, the researcher was given an opportunity to compare the statistical data with comments about services during the interview. The charts in this chapter clearly show a sub-level service effort in most of the county media centers in California. When interviewed, however, the respondents felt the service function was performed with effectiveness and efficiency. Teachers and administrators in schools which were visited, for the most part, concurred in the opinion relative to a favorable service. It is also recognized that the standards[2] established by the Audio-Visual Education Association of California (AVEAC) and the California Association of School Librarians (CASL), are not familiar to the school personnel. These standards are designed in two phases: Phase I specifies the minimum standard for film - 700 titles for the elementary level and 700 titles for the secondary level; Phase II reflects desirable standards - 1,400 titles for the elementary level and 1,400 titles for the secondary level. The standards also list the need for seventy or more duplicate prints per 1,000 students served. The AVEAC - CASL standards are employed to provide a basis for a comparison of "what exists" with "what should be" for optimum service.

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[1] Henry M. Brickell, *Organizing New York State for Educational Change*. A Report prepared by the University of the State of New York (Albany, New York: State Department of Education, December, 1961), 102.

The study was primarily concerned with the county schools instructional materials centers. One city center was used, however, to draw a comparative analysis and to illustrate similarities in functions. The implication derived from the visitations and the questionnaire is that effort by the staffs of the centers is directed towards providing materials to teachers for timely and effective instruction. Based upon this basic objective, that the effort of a media center is directed toward the instructional process, one may assume a change is necessary to improve the service function of the media center.

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[2] W. B. Hicks, and L. Nelson, "Standards for the Development of School Library Programs in California," (California Association of School Librarians and Audio-Visual Education Association of California, 1967), 28.

Because the proposed system assumes cooperative amalgamation between cities and counties, the similarities in function are illustrated to demonstrate that standardization of certain procedures is possible. Fifty counties in California provide media service in varying degrees with duplication of functions existing among the centers. Several examples illustrate the significance of this duplicated effort:

Catalogs - Each center catalogs its materials by compiling data about media in its library, classifying, and reproducing it in sufficient quantity for teachers within the service area.

Booking - An ordering system and booking system exists to maintain information about requests from teachers, schedules, and shipping data. However, one method of overcoming the high cost of producing order blanks has been the standardization of these forms which many centers use, thus reducing the per unit cost. It seems that booking cards could also be standardized to increase the benefit of quantity buying. Should data, which is put on booking cards, also be standardized, the data bank existing in NICEM's system could be used to produce the cards eliminating the periodic typing of title cards.

Processing and Shipping Data - Standards for classifying, numbering, and shipping data forms could include the same data as needed in the booking-cataloging process. Also, the work of processing new materials and shipment of these materials to and from school could be minimized through standardization of forms, film leaders and trailers, and a system for classifying, analogous to book library procedures. Taking advantage of standardized formats, forms, and data classification would provide a degree of economy and provide familiarity when using different media centers.

The questionnaire (Appendix C1), mailed to the fifty county media centers, was designed to provide information which would demonstrate the feasibility of introducing electronic data processing into the media centers. A seventy-five percent return was achieved through a follow-up letter and telephone calls. For the purpose of this study, the return seemed sufficient since bias from less than one hundred percent would not adversely affect the results. Counties with media centers were grouped according to the

Average Daily Attendance (ADA) served as reported by Nichols.[3]

	Per County	Combined Counties
- Group I	Less than 20,000	152,314
- Group II	20,000 - 49,999	332,901
- Group III	50,000 - 99,999	658,429
- Group IV	100,000 or more	2,101,213

Alpine, Colusa, Del Norte, Lake, Nevada, San Benito, Sierra, and Yuba Counties contract with neighboring counties for audiovisual services, and therefore are not included in the above grouping. (Appendixes C2, C3, C4, C5)

The number of schools served by the counties, based on the four groupings (Figure 1), is:

- Group I	408
- Group II	519
- Group III	1,066
- Group IV	1,944

It should be noted that there are approximately 408 schools in the Group I schools within the twenty counties of this category. These are sparsely settled mountain and desert counties, as contrasted with the nine counties of the metropolitan areas of Group IV.

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[3] H. L. Nichols, *Compilation of Data Pertaining to Audio-Visual Services of County Superintendents of Schools Offices* (Sacramento: California State Department of Education, 1967), 1. (Mimeographed)

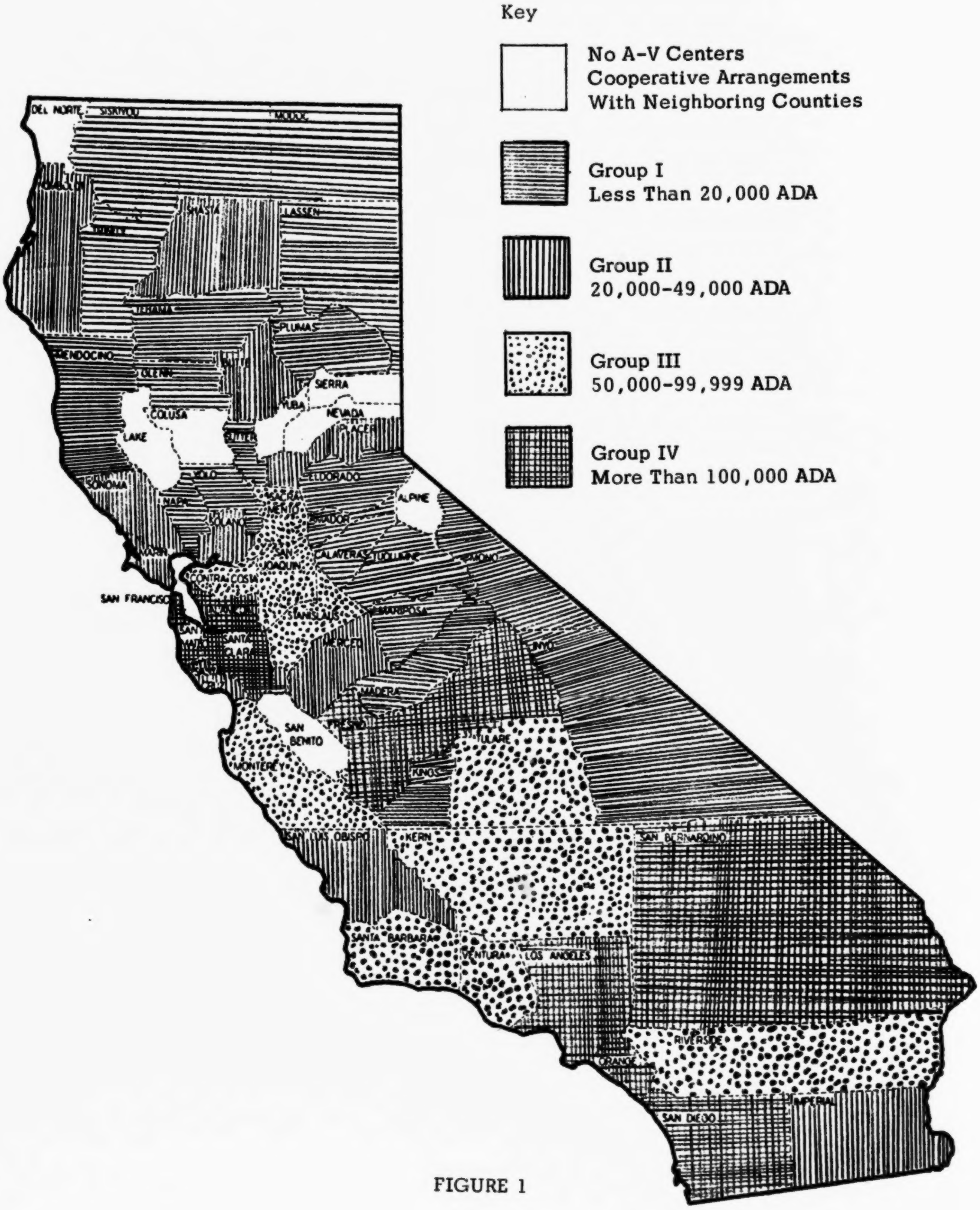

Key
No A-V Centers
Cooperative Arrangements
With Neighboring Counties
Group I
Less Than 20,000 ADA
Group II
20,000-49,000 ADA
Group III
50,000-99,999 ADA
Group IV
More Than 100,000 ADA
DEL NORTE
SISKIYOU
MODOC
HUMBOLDT
SHASTA
LASSEN
TRINITY
TEHAMA
PLUMAS
MENDOCINO
GLENN
SIERRA
YUBA
NEVADA
COLUSA
LAKE
SUTTER
PLACER
YOLO
ELDORADO
SONOMA
NAPA
ALPINE
SACRAMENTO
SOLANO
AMADOR
MARIN
SAN JOAQUIN
CALAVERAS
TUOLUMNE
MONO
CONTRA COSTA
SAN FRANCISCO
ALAMEDA
STANISLAUS
MARIPOSA
SAN MATEO
SANTA CLARA
MERCED
INYO
MADERA
SAN BENITO
FRESNO
TULARE
MONTEREY
KINGS
SAN LUIS OBISPO
KERN
SAN BERNARDINO
SANTA BARBARA
VENTURA
LOS ANGELES
RIVERSIDE
ORANGE
SAN DIEGO
IMPERIAL

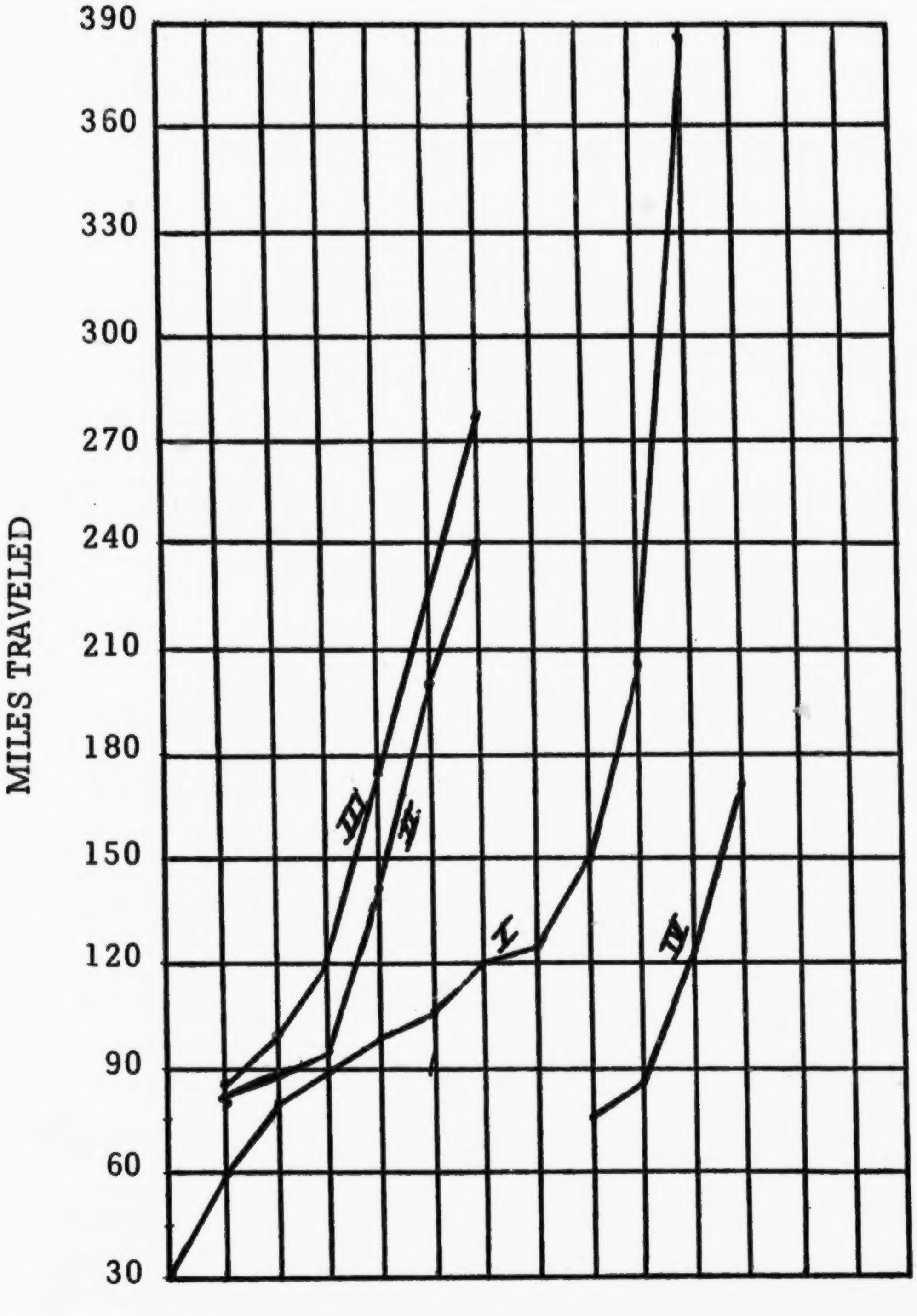
FIGURE 1

Paralleling these figures are those which show the number of teachers in each group:

- Group I	6,041
- Group II	9,052
- Group III	21,913
- Group IV	36,386

The complexity of serving the needs of schools and teachers begins to reveal itself in the magnitude of the population served and distances traveled (Figure 2). Coupled with the geography of the areas served is the cost per teacher as it relates to distance. It is rather obvious that the expenditure for services in the Group I schools is proportionately greater than for those schools and teachers in the Group IV schools.

It was evident that the use of materials by teachers (i. e., bookings per item, Appendixes C2, C3, C4, C5), when compared with delivery schedules and distance traveled, showed a reduction. In the Group I schools, an average of 2.4 bookings (Appendix C2) were made for the year 1967-68, as contrasted with 6.9 bookings in the Group IV schools (Appendix C5). Access to materials by teachers is a key factor, therefore, in the use patterns of teachers. Access to schools by mail or truck delivery also provided a significant difference in quantitative patterns of use. An excellent example of access is the analysis of the Santa Clara County Center (Appendix C5) use pattern. Delivery to



COMPARATIVE DISTANCES TRAVELED
FOR DELIVERY (ROUNDTRIP)

FIGURE 2

schools is on a daily schedule, resulting in an average booking per item figure of 20.4, an average which is far beyond any other figure existing in cited reports. The Sacramento County Schools Center (Appendix C4) twice weekly delivery schedule provides no significant increase of quantitative use over the weekly delivery schedule of the other counties.

Corrective measures seem necessary if we are to provide access to media now housed in centers throughout California. Based on the use patterns, it is possible that a "media overload" exists. The overload occurs, not because of quantity as compared to use potential based on population; rather, it is due to the difficulty in processing materials for distribution and utilization. During interviews, the interviewer was repeatedly cautioned by respondents with statements reflecting barriers to automation, such as: cost, dependability of technology, and logistical problems in the development of an automated system. The interviewer reiterated the potential of the system in the total communication-education process, part of which is embodied in the State plan for the development of educational television.[4]

> We are moving into the most demanding era in our history. An educational system grudgingly and

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[4] *Educational Television for California*, California Television Advisory Committee (Sacramento, California, 1966).

> tardily patched to meet the needs of the movement will be perpetually out of date. We must build for the future in education as daringly and aggressively as we have built other aspects of our national life in the past.[5]

Current procedures employed in media centers will no longer suffice to satisfy the utilization demands placed upon the media. Media overload, in fact, may exist because of functions which are performed manually subsequently reducing efficiency. The example of this dilemma is provided in Figure 3. Excepting Group I counties, the number of films owned exceeds the number required and the standard as defined by the Audio-Visual Education Association (AVEAC) and California Association of School Librarians (CASL). Because of geographical locations and sparcity of population, a greater number of film titles are necessary for a minimal service. Even though the number of titles is greater, they fall short of the AVEAC - CASL requirements. An examination of the data on film ownership reveals a logical analysis with the table (Figure 4) showing duplicate films owned. Group I counties purchase more titles but need fewer duplicates. Group IV counties purchase considerably more duplicates to satisfy the demand but are unable to enrich their libraries with a greater variety of titles.

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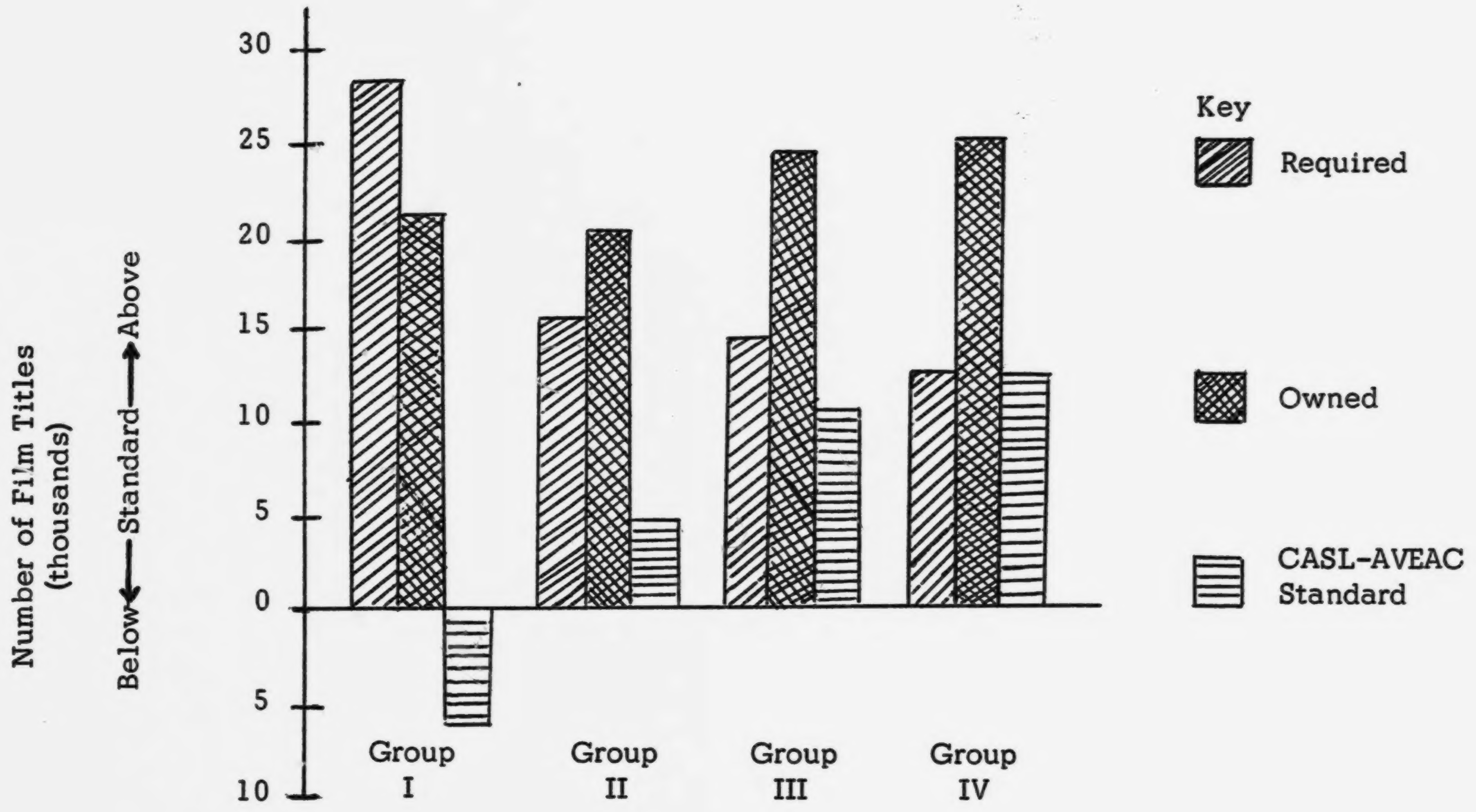
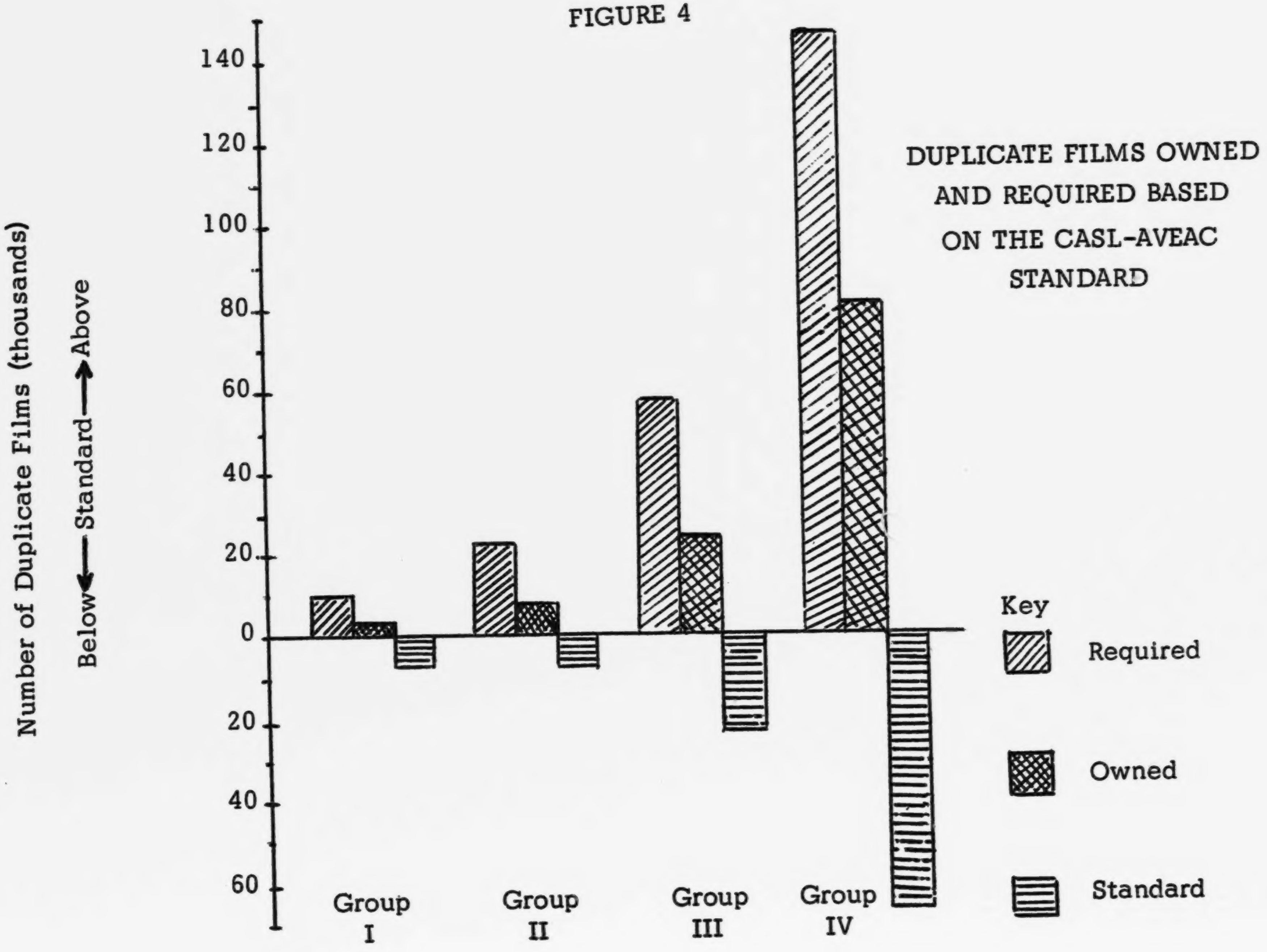
[5] Social Studies Project Report V, *The Pursuit of Excellence - Education and the Future of America*, America at Mid-Century Series, (Garden City, New York: Rockefeller Brothers Fund, Inc., Doubleday and Company, Inc., 1958), 49.



THE NUMBER OF FILM TITLES OWNED AND REQUIRED BASED ON THE CASL-AVEAC STANDARD

FIGURE 3

FIGURE 4



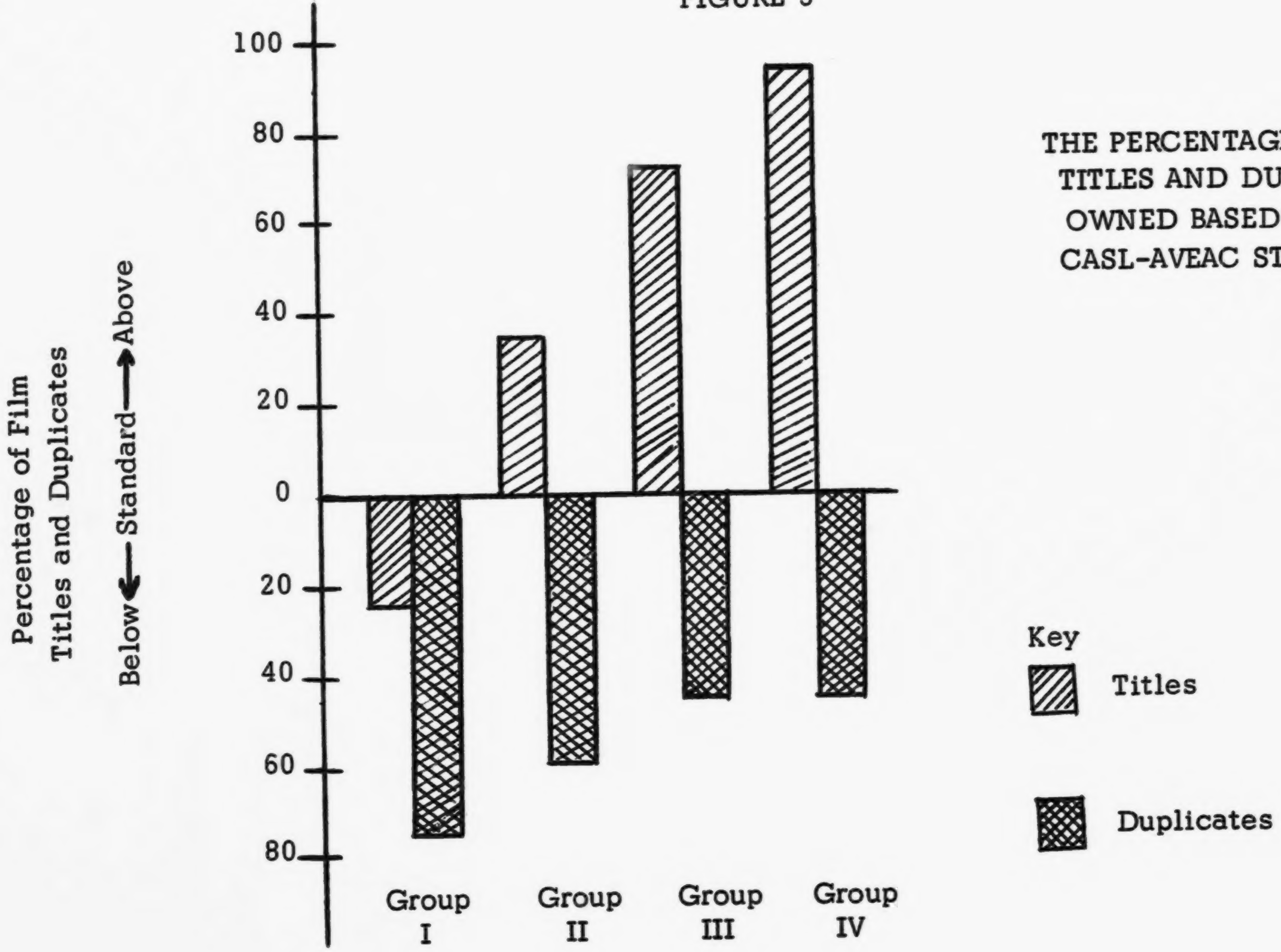
DUPLICATE FILMS OWNED AND REQUIRED BASED ON THE CASL-AVEAC STANDARD

All county groups, however, show a need to improve their holdings of duplicate titles. The heavier the population base which is served, the greater the need for duplicate titles to satisfy the demands. As the statistics for bookings are examined in Appendixes C2, C3, C4, and C5, one is able to extrapolate that a more efficient method of processing, distributing, and using materials is necessary.

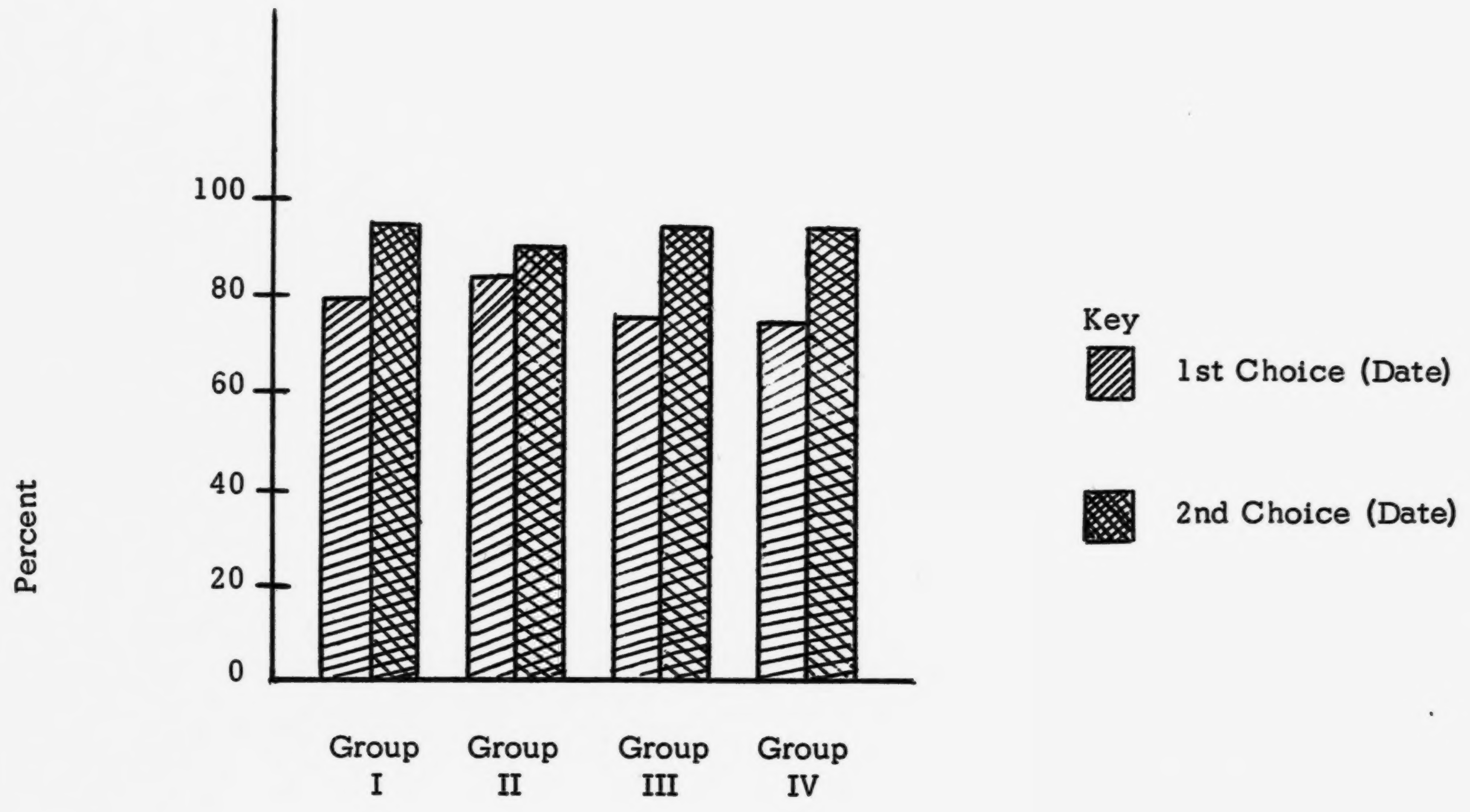
The percentage table (Figure 5) illustrates the comparison of needs to AVEAC - CASL standards. Because it may be difficult to acquire sufficient funds to meet the demands of schools upon the media center, the problem of increasing holdings to satisfy quantitative use will be difficult to solve.

Upon examination of the table (Figure 6) showing requests honored on the first and second choice, the reader may conclude that inconsistencies exist. These inconsistencies resulted from the low average bookings per item and the quantitative standards (holdings) as contrasted with a center's ability to deliver a title when requested. The high percentage of delivery (Figure 6) as reported on the questionnaire, contrasted with the predominantly once-each-week delivery schedule, and is difficult to reconcile.

FIGURE 5



THE PERCENTAGE OF FILM
TITLES AND DUPLICATES
OWNED BASED ON THE
CASL-AVEAC STANDARDS



PERCENTAGE OF REQUESTS FOR FILMS HONORED ON FIRST CHOICE AND PERCENTAGE INCREASED FOR FILMS ON SECOND CHOICE

FIGURE 6

Conventional Media Centers

An analysis of two centers, a city unified school instructional materials center and a county curriculum materials center, has provided the reader a description of detailed operations which currently exist. The description provides an analysis of procedures which demonstrated similarities and allowed for insights toward the potential of automation. These potentials are described later in the chapter. Centers are being converted to partial automation to alleviate the work load created through an increasing volume and use of media.

An effort was made to gain, from each person interviewed in the Instructional Materials Centers and school, the details of each operation related to films. This approach allowed for an opportunity to analyze each process to determine the interrelationships inherent in the total system structure relevant to the study. An example of the study of conventional systems provided the researcher with two types of data: (1) the information needs of a center regarding films, and (2) the process flow for decision-making related to the operation of a center.[6]

The objectives for studying conventional systems, as stated above, allow for the determination of needs for automating procedures within the center. Once an adequate determination of specific needs and objectives for information is made, it seems possible that automated processing will hopefully provide for efficient and effective alternatives. The gross objective of the Instructional Materials Center, as derived from interviews, is to provide for quality curriculum materials at specified time schedules which will contribute toward strengthening the teaching-learning process. The conventional system descriptions, which follow, represent only two of the many centers studied. Similarities in the process exist in each center. Detailed descriptions are provided for two representative centers in California: (1) Sacramento Unified Schools Instructional Materials Center, and (2) the Alameda County Curriculum Materials Center.

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[6] Sidney C. Eboch, "A Process and Systems Structure for the Field of Audio-Visual Communication," Unpublished Doctor's Dissertation, School of Education, University of Southern California (June, 1962), 39-44.

Sacramento Unified Schools Instructional Materials Center

Film Acquisition

A long and often cumbersome process of: (1) acquiring data about new films, (2) establishing a preview and evaluation program in the district, (3) acquiring films and scheduling them for evaluation, (4) compiling the results of evaluations, (5) determining priority needs and purchases, (6) requisitioning and ordering new and duplicate films, (7) budgeting for films, and (8) additional administrative procedures implied and necessary in numbers one through seven above.

Processing a New Film

Data flow in this center begins with the delivery of a film to the Instructional Materials Center. This does not preclude the need to study the process which precedes the delivery of the film. The processing for incorporating a film into the media center library is specific to the center. The procedures as listed below provide specificity to the media centers studied.

Following receipt of the film in the center, the requisition is retrieved from the file to check and confirm the following: (1) price of the film, (2) distributor, and (3) stock (color or black and white). Once confirmed, a three-inch by five-inch card is typed, including: (1) Dewey classification number, (2) subject category, (3) bio-data (title, length in minutes, stock), (4) distributor and price, (5) date of acquisition, and (6) a separate card is coded for data processing. A punched card format for cataloging purposes is also prepared at this step of the process. This card indicates by means of codes the following information:

- Type of media
- Length of film
- Color or black and white designation

- Producer code
- Number of copies of the title
- Date of acquisition
- Grade level

The coded card is delivered to the data processing center for keypunching and integrating into the catalog.

A very similar card, known as a "shelf card" is also prepared for the purposes of inventory control. Since films are filed according to size (four hundred feet and below in one section, eight hundred feet and above in another section), these cards are similarly filed; that is, alphabetically according to the two size designations. A total of three cards is used for maintaining records on each film. This does not include computer cards or booking cards.

The master booking card is typed showing the Dewey number classification, stock designation, and time. Other data about the media is entered on the card as indicated in the accompanying sample (Appendix D1). This card is only used as a "cover (identification) card" for the calendar booking card (See sample). The calendar card is expendable and is used to make the booking entries including a number code (for school) and for drawing a line through the inclusive dates for which the film is booked.

While all records are being completed, the film is forwarded to the repair maintenance area for labeling and processing. Leaders and trailers are applied on the film upon which titles are printed. The film is checked to confirm the stock designation and rewound through the machine to apply a protective silicone coating. The can is labeled with number and title and filed in its proper rack position.

Cataloging

As indicated above, cards are prepared and routed to the data processing center including all necessary coding. The clerk "pre-spaces" the data on these three-by-five cards for the keypunch operator. The annotation is marked, with a red pencil, consistent with the punched card format. These processed cards are routed to the data processing center, information keypunched, and an alphabetical print-out by title is supplied for editing and correcting. A second print-out, using the Dewey classification codes which are employed in this center and subject heading codes for the listing, is also printed for proofing.

The center makes an effort to provide supplemental catalogs during those years a complete catalog is not printed. This, it is advised, is not always possible. Three catalogs are published to cover the various educational levels served by the center. Edited and corrected copy is returned to the data processing center. Corrections are keypunched and another computer run is made which provides the final print-out. This copy of the computer print-out is sent to the multilith print shop (district's) where the copy is photo-reduced, and masters are completed and made ready for printing. The catalog is printed on offset equipment, collated, bound, and returned to the media center. While the catalog printing is completed, preparation is made for distribution to teachers. Catalogs are packaged and distributed to schools through the truck delivery system.

The catalog, as in all centers studied, is the main resource for the selection of audiovisual aids. Free materials from sponsored organizations, such as Standard Oi Company, Bell Telephone Company, and Shell Oil Company, are available for use. The center personnel will help locate the required material, acquire it, and return it as a service for teachers.

The acquisition of "free" materials from sponsor organizations is an added service performed by the media center. Often industrial organizations which produce medi for educational uses will provide certain titles on a lon term loan basis. Others provide catalogs of those materia which are available upon request. This information is usually directed to the administrator in the district who is responsible for media services. The information is compiled and distributed to teachers and administrators o schools within the service area. This procedure is encouraged by companies supplying the service to better coordinate the many requests for these exceptional materials. Usually the company also requires an attendance report which is the basis for justifying expenditures for educational services within the industry.

Selecting and Ordering

The single item Moore form introduced in centers was hailed as a step closer toward efficiency of operation. This form, used in five copies, provides confirmation to teachers, shipping, and master copy which eliminated the need for typing invoices. The effort to communicate a teacher's needs to the center and the center's confirmation and delivery instructions to the teacher became the sole responsibility of the teacher. It is the teacher who initiates the entire transaction by finding the appropriate material in the catalog and entering the choice on the form (Appendix D1). This is forwarded to the center by mail or truck. The teacher may order in this particular center up to three months in advance. (Longer periods of six months to a year are allowed in other centers.) This ordering restriction is used to avoid over-ordering by teachers and a massive filing job at the center. Each order is sorted according to the preferred or "first choice" data and type of media. They are filed in a Kard-Veyer (Remington) by date of delivery. Each Kard-Veyer tray holds the current month's orders. The entire tray is removed and placed at the Wheeldex booking desk.

Booking

Each order is retrieved from the tray and checked. The film title listed is located in the Wheeldex (Appendix D1). The reservation is made by entering the school number code and drawing a line through the inclusive dates. Should the film be unavailable, alternate dates, if listed by the teacher on the order form, are booked. If there is no entry for alternate selections, the conflict is noted and a tally mark is entered on the booking card. The entry "not available" is made on the order form and the order is returned to the teacher. The booking clerk also has another alternative available to her. Sensing the need to provide a film to a teacher, the clerk may provide an alternate film of similar subject matter. The booking clerk, having a familiarity with the media in the library, may intuitively select an alternate title for the teacher if the requested title is unavailable. Often, a teacher also gives the booker this latitude.

The orders are replaced in the "confirmation" file. They are removed by another clerk who proceeds to separate the five copies. The master file copy and packing slip are refiled in the Kard-Veyer tray. Confirmations are filed in a school file and packaged for delivery with the next truck delivery.

Shipping

On the specified day of delivery, all orders are pulled from the Kard-Veyer file and routed to the shipping clerk. The shipping clerk must sort file orders according to size, prior to retrieving the film from the rack. Films in this center are filed according to size. All four hundred foot reels are placed in racks separate from the larger sizes. This filing procedure is dictated by the different sizes of films. Because of different sizes of film cans, filing must be done in this manner. If the department stores more than one copy of the film, the clerk must note the copy number to be retrieved. Films retrieved are processed at the shipping counter and the packing slip and master invoice copy are separated. The packing invoice remains with the order; the master copy is routed to the booking desk to be filed. Orders are placed in bins by school and delivery schedule. Near the termination of the working day, all shipments are bagged and tagged by school and placed in readiness for delivery the next morning. The delay, prior to bagging orders, insures packaging of complete orders. Many times films are not inspected and repaired when orders are being prepared. Also, last-minute emergency calls for films assures the "one-time" handling of the complete order.

Since all IMC's are attempting to constantly maintain optimum service, staffs are geared toward last-minute hopes of locating a film to be included in the current order. The Sacramento City Schools system provides a control-location mechanism to assist the staff in locating films which may be returned during the current day's truck delivery.

The method developed is called the "want-list." The list merely contains the film titles not located at the time orders are prepared for shipment. Rather than looking for each film and holding up progress on all the orders, films not located are listed on a separate sheet. This list is used after all orders are completed. The shipping clerk gives the list to the booking clerk, it is typed, and then it is used as a check sheet. The film inspection area is checked and films may be located. If so, they are given priority treatment. If others are still needed, the returned shipment is checked when the trucks arrive from the schools.

Periodically, films that have been booked and confirmed for delivery are not returned in time for subsequent delivery as promised. Several reasons may cause this problem:

- The present user did not return the film to the school pick-up area in time for the delivery man's visit. The teacher may have been using it at the precise time or had not yet used it. This failure to return media on schedule disappoints the next user. Telephone calls in a district allow for a convenient search mechanism to get titles returned.
- The film may have been misplaced and was not located in time for processing and delivery to the next user. The cause of this problem may be due to careless handling and monitoring procedures at school or at the center.
- The film may have been damaged too severely for immediate use. The current equipment used in many schools is not "film damage" safe. Improper handling and projector operation may cause serious damage rendering the film unusable.

There may be additional causes for failure to satisfy a confirmed request, however, the above reasons are predominant.

The drivers load their vehicles for the day's delivery schedule soon after the start of work in the morning. Deliveries are made to the school's "drop-point" and drivers pick up the previous week's deliveries. The driver does no checking of materials at the school. He returns to the IMC and deposits his day's pick-up load in the specified school's shipping-receiving location. Bags are emptied on a table, tag labels are removed from the bags, and the bags are placed in storage. Packing slips are removed from the film can and the film title is checked against the title on the film can. Packing slips are filed, as checked off, in a multi-sort file alphabetically by school and truck route. The file with the packing slip is returned to the booking clerk who uses the slip to check for films on the "want-list." Should a film be located, it is retrieved and immediately routed to the inspector. The film is checked, repaired and/or cleaned, and sent to the shipping clerk for processing in the current shipment.

Maintenance

Meanwhile, all other films returned have been checked and carted to the film inspection department. Films are checked, repaired and/or cleaned, and placed on a moveable cart. Another clerk rolls the films into the storage area and refiles the processed films in their proper storage rack.

Utilizing Films - Teachers

Teachers in schools who have access to media from their own district center assume a different role than their counterpart in districts receiving media from county centers. Often, the difference lies in the ease of communications and simplicity of checking on needed or lost materials. Contrary to this advantage, are the stringent regulations for handling materials from their own district centers.

The district director of the center has established coordinators in each school. These coordinators are teachers assigned the task of receiving the school's shipment, checking invoices, and processing the media through the teachers and subsequently seeing that they are returned at the specified time.

Materials are delivered to the school at the "drop-point." A student monitor is notified upon arrival of the shipment. The materials are delivered to the teacher-coordinator who checks the enclosed (shipment) invoice with each media title. A record sheet is made up for each title including data on: teacher name (who ordered the title), date of arrival, title of media, length in minutes, and the due-back date. This record is kept by the teacher-coordinator. (The teacher-coordinator is a full-time teacher assigned responsibilities for maintaining the logistics of audiovisual services within the schools.) While the above record is being completed, the media is sorted according to the teacher who ordered the title. If a particular title does not arrive, as scheduled, the teacher makes this notation on the center's invoice which accompanied the shipment. This notation absolves the school of responsibility for a title not delivered on the requested date.

Teachers are then notified following the arrival of materials through student monitors. Equipment schedules are provided and teachers sign the schedule for the desired date and time for showing. An interesting situation exists in the social science area. Since this is the area of greatest use, all materials and equipment are pre-scheduled. This rigid schedule is provided to assure the sharing of equipment among all teachers.

A crew of boys is assigned to deliver the equipment and set it up for showing. Often, teachers in the classroom have their own students trained, and therefore, delivery of equipment is made and the students in the classroom will be responsible for setting up and running the equipment.

Because teachers at the district level have a familiarity with the material, they often eliminate the preview of materials before display during instruction. There appeared to be no provision for previewing films prior to showing. Upon completion of the instructional sequence, media is returned to the coordinator who checks the titles against the log (described above). The media is bagged and returned to the "drop-point" located in the school office.

Should a teacher wish to keep the film longer, permission must be obtained from the center. A check of the booking cards may allow for an extension. However, another booking may require its return. If the teacher did not have an opportunity to use the media while at his school, his chance for optimizing effective utilization may have been thwarted.

Reactions to the above procedures by the teacher-coordinator seemed to indicate a need for relief from the great amount of non-teaching duties inherent in this system. Should the proposed system be adopted, this individual would be most pleased.

The conventional system description for a city school district varies with its counterpart in a county system only in the degree to which controls are maintained. Each system is designed as a service of providing educational films to all teachers for their lesson plans. Although the service provides other media, the educational film receives the greatest attention, service, and use.

Alameda County Schools Curriculum Materials Center

In the Alameda County Superintendent of Schools Office, the Division of Curricular Services, under the administration of an assistant superintendent, is comprised of three departments. One department is the Curriculum Materials Center (CMC) (Appendix D2). It is comprised of the following integrated services: an audiovisual section, a schools library, a curriculum library of professional materials, and an audiovisual production laboratory. Since these services have been combined into a single administrative unit, teachers are selecting materials with more discrimination and evaluating each teaching aid in terms of what they hope to accomplish.

Functions of the Curriculum Materials Center[7]

1. To promote wise use of all materials of learning, subscribing to the belief that teaching tools should not be compartmentalized into books, equipment, or audiovisual aids as things in themselves, nor should professional training materials be isolated from the materials used in the classroom.
2. To coordinate the evaluation and procurement of instructional materials. Teachers and administrators help to select new materials through their participation in evaluation committees throughout the county. Curriculum planning meetings for teachers are held at the center in order to be close to the materials.

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[7] Rock La Fleche, "Curriculum Materials Center," pamphlet by the Alameda County Schools (March, 1961), 13.

3. To facilitate a better utilization of materials by making these materials readily available to teachers through regular weekly truck deliveries directly to the individual schools.
4. To provide professional leadership at regular meetings of all members of the county superintendent's professional staff where books are reviewed, audiovisual aids evaluated, and new projects to be developed by the production laboratory are planned.

Functions of a center require specific processes which assume efficient and effective service to the teachers within the service area.

Film Acquisition

Operational procedures in a county for the preview and evaluation of media vary from their counterparts in the city districts. Preview committees are requested and serve in the evaluation procedure on a voluntary basis. "Captive" committees such as may exist in city districts do not exist. Hopefully, administrators and teachers consider the evaluation of materials sufficiently important that they dedicate their efforts to the responsibility as called upon.

Committees are organized on a grade level basis with supplemental expertise, when required, selected from subject matter specialists. For example, if science media are being evaluated, the committee will be augmented by individuals with a science specialty. Other committees may include professional staff members within the county office itself. These members may recommend that materials get a "field" evaluation prior to actual purchase. However, the county staff is used to evaluate materials for inclusion in the CMC library. Procedures for the evaluation of a film follow those described for the city system. Compilation of data follows the preview and evaluation process to determine the titles which gained the greatest positive reaction. Based on the evaluation and a survey of the needs, priorities for purchases are agreed upon. The list of titles and descriptions of the media are provided to the county board of education each month for their examination and approval. After approval by the board, the center may requisition for the purchase of the approved list. Business procedures in the county are separate from the CMC; therefore, the requisitioning process is completed and routed to the business office, which in turn issues a purchase order for the requested media.

Processing New Films

Upon receipt of the film, the shipping clerk locates the purchase order and marks the film "received." The purchase order is routed to the coordinator for clearance, who then directs the business office to forward payment.

This center adopted the accession numbering system; therefore, the next highest number is assigned to the film and the "Incorporation of New Stock Notice" form (Appendix D3) and an inventory historical (control) card (Appendix D4) are completed. These cards, containing all bio-data about the film, are routed to the catalog clerk. A series of cards is made for the master files, catalog clerk's files, and shipping department files. This card duplicates the data found on the inventory card. All cards and forms are attached to the incorporation form and routed to the main office file (clerk), booking (clerk), and placed in the teacher master file. As these cards are routed and filed, the remaining form ("incorporation notice") is returned to the shipping department and filed.

Concurrently, the film has been routed to the inspection-maintenance area where a label showing the title and accession number is made and attached to the film can. A film leader and trailer is attached to the film, upon which identifying numbers are marked. The film is filed on the rack, ready for distribution.

Catalog Preparation

A number of centers have adopted the addressograph plate system for compiling and printing the catalog of instructional materials. The input and output systems are basic to the hardware which is incorporated in the addressograph system. Functions in cataloging are divided between professional and clerical persons. Because grade level and subject descriptions must be made, the coordinator is responsible for providing this data to the catalog clerk. Additionally, the coordinator must also provide an annotation which meets the restrictive specifications of line length and number of lines per addressograph plate.

This data is routed to the catalog clerk. Metal plates are made on a special addressograph printer and a "proof card" is made to allow for proofing and making any necessary corrections. The grade level is then stamped on each card and filed in a three-by-five card file. A card for each of the following files is then processed in the addressograph printer: (1) inventory card, (2) source file card, (3) teacher's master catalog file, (4) booking desk reference file, and (5) coordinator's card file.

When the coordinator receives his card, this provides the proof of delivery of the title so that the purchase order may be cleared for payment. Concurrently, the catalog clerk prepares the metal plates for catalog purposes prior to filing in their proper sequence. Special addressograph files and the standard addressograph tab system for keying the metal plates are used to provide proper reproduction. Tabs are used on each plate to designate grade levels, subject areas, type of media, and whether National Defense Education Act funds were used to purchase the media. The

NDEA tab is used for auditing purposes, should the Federal Government authorities request one.

When a catalog is produced, the special file drawers are pulled and loaded in the machine. The tab selector is adjusted on the printer, ink jets are adjusted to assure the proper flow of ink to the print pad, and the paper jig is set for proper spacing and formatting on the special duplimat master. The format of the master and plates restricts the number of impressions which may be made on each master. Following the imprinting of every necessary item for the particular catalog to be produced, the compiled masters are routed to the multilith printing room to be reproduced, collated, drilled for three-ring binders, and inserted in the binders as a completed catalog. The distribution of catalogs is dependent upon the number of teachers which will be using the particular graded catalog. For high schools, catalogs are reproduced by subject. This allows for departmental distribution. For example, materials for Industrial Arts, Social Studies, and other subjects are cataloged separately. Should teachers be assigned more than one subject discipline, they are provided with catalogs to cover each of these teaching assignments.

Selecting and Ordering

The order form used by teachers in Alameda County allows for multiple listings. (Appendix D5)

Following the selection of appropriate titles from the catalog, the teacher lists the pertinent data on the order blank and mails it to the center.

Limitations on ordering media vary from the elementary to the secondary level. Periods for elementary range up to a six-week limit in advance of utilization; and the secondary teachers are permitted to order for the entire year. The limitations are placed on teachers primarily for the utility of doing business in the center. Requests and processing of orders is so voluminous that it is difficult to maintain the efficiency necessary for optimum service; secondarily, it is recognized that a six-week period (elementary) is a sufficiently long period for instructional planning.

An additional work load, at the center, is placed upon the booking staff. The order form provides for multiple listings. (See below.)

Booking

Upon receipt of the order, it is date stamped and filed. Each booking clerk retrieves the order from the file to book those materials which will be located in her particular Wheeldex file. Because there may be many items on the order, the order may be used by many booking clerks before the complete order has been processed. The school name and an arrow between the inclusive dates is entered on the booking card (Appendix D6). The entry is made on the card in the column to the left of the title to show the item was booked. If a particular title was not available when requested, the alternate date, if shown on the order, is honored. (The "not after" designation provides an alternate block of time.) The order is also coded to provide information regarding actions taken on certain titles such as: code #1 means title "not available on dates requested." (See sample order form, Appendix D5.)

When it is not possible to deliver the title on the date ordered, tally marks are made on the booking card. Periodic counts of these tallies will provide data on needs for purchasing duplicate titles. The delivery and return date is the final entry made on the booking clerk. Upon completion of the order, it is routed to a file clerk who separates the five copies and files them according to the next action: (1) orders are filed in a "main" file according to week of delivery; (2) confirmations are stored in a "Q" file until the end of the day. These are mailed to the schools each day: (2a) envelopes are typed and stamped "Audio-Visual Confirmation," (2b) envelopes are stuffed, (2c) they are run through a stamp machine, and (2d) mailed via first class mail. Before the close of the day, all orders are pulled from the file for the next day's deliveries and the green copy is pulled. The green copy is used as a permanent office record. These are alphabetized by school and each item is tallied. This tally is used as a distribution record. The daily tally is used for a monthly report. The green permanent copy is filed until the end of the month. They are removed from this temporary file, stapled (by month), and "permanently" filed alphabetically by school. Procedures in the booking process as in all the others may vary from the city system described above. The differences are merely in the level of detail and the personnel interaction. The gross function, however, is the same.

Shipping

The shipping clerk reports to the booking office to pick up the orders for the day. Upon return to the shipping area, orders are sorted according to the three truck routes. Each film number is then entered on a "posting sheet." This procedure organizes the actual order according to the film rack filing system. Each film is pulled from the rack and placed in the corresponding number slot on a truck, which is especially constructed to duplicate the posting form. The films are taken to the shipping table and stacked according to school.

Bags are used, as in most centers, for each school. The bags are tagged and removed from the special racks and placed on the floor according to delivery schedule. The truck driver loads his truck and delivers the films to the designated "drop point" at each school. The films used the previous week are picked up and returned to the center. Prior to loading the films to be returned, the driver checks each title against his shipping invoice. Should they all be accounted for, he loads them into his truck; if not, the school official is requested to locate the missing title or titles. Upon completion of the search and the title is retrieved, the driver loads the truck and leaves the school. However, if the title is not located, a notation is made on the invoice for the booking clerk. Upon his return to the center, the driver routes this information to the booking clerk, who extends the booking and processes a letter to the school to continue the search of the missing title.

Maintenance

The truck is completely unloaded and all films are removed from the bags and loaded on a hand truck. The films are trucked to the maintenance area where they are checked, cleaned, and repaired (if necessary) and reinserted in their containers. Films are again placed on the hand truck and taken to the storage racks to be filed. The driver files his own shipping invoices for future reference-control needs.

Utilizing Films - Teachers

Receiving media from a county media center varies slightly from the self-contained city system.

Non-instruction time expended, however, is evident in both situations.

Upon delivery of a film to the school, the delivery man acquired the signature of an administrative official on the invoice (driver's copy). Usually, this is accomplished by the school secretary. Student monitors deliver the media to each teacher whose name appears on the invoice (school copy). Teachers must sign the invoice confirming delivery of media to his classroom. The invoices are returned to the secretary who posts them on the bulletin board for information to other members of the faculty (other members of the faculty interested in using the media while it is at the school will be able to make arrangements with the requesting teachers).

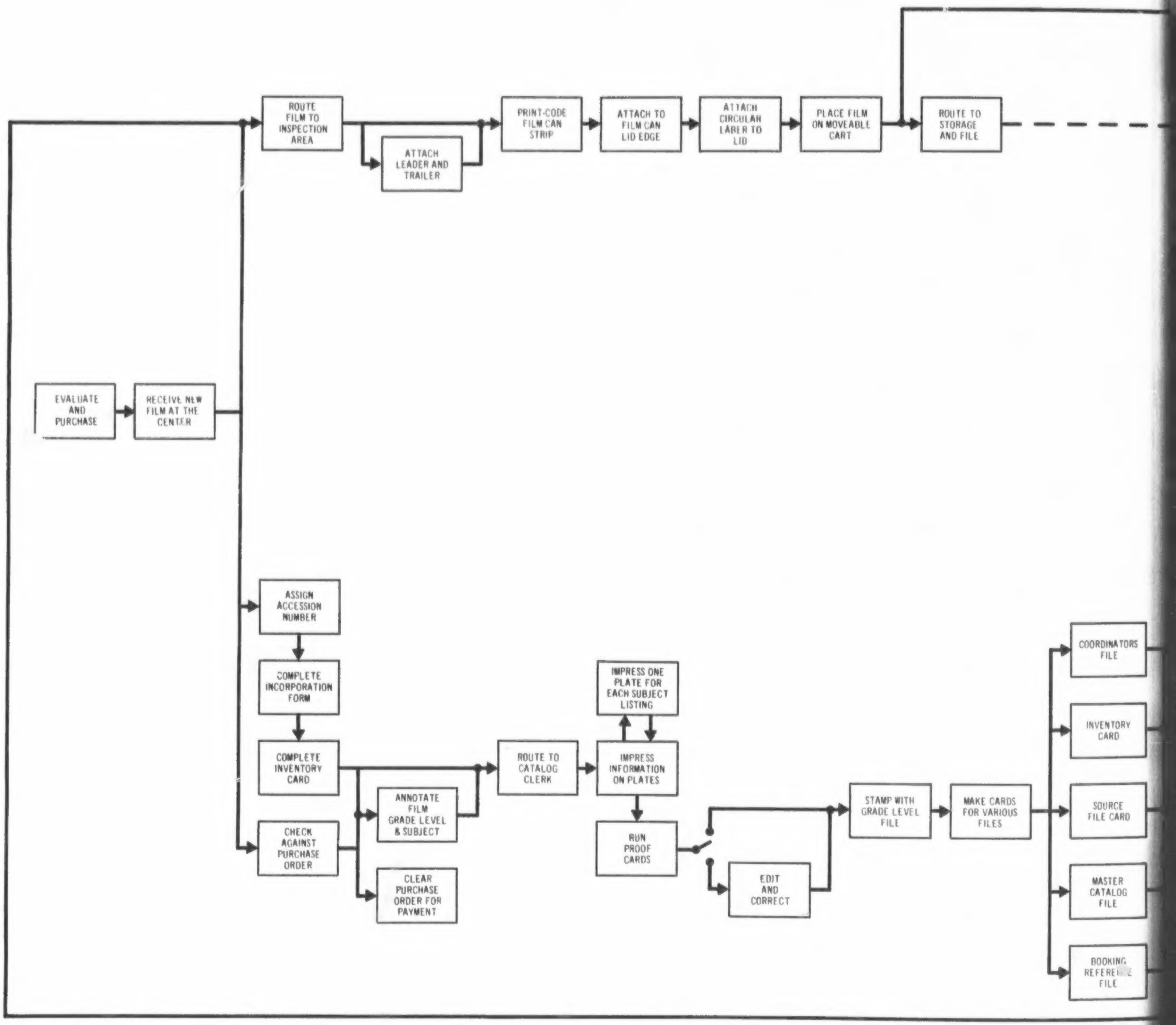
The teacher begins planning a teaching strategy for using the media (the advance confirmation gave prior notice and instructional plans were formulated earlier). At the time of delivery, however, the teacher finalizes his plans. This finalization may include a preview of the media, necessitating the acquisition and use of a projector.

Meanwhile, the teacher schedules the equipment for his class presentation. At the elementary level, the teacher is responsible for obtaining the projector from storage, setting it up, and showing the film to his class. When the instructional sequence is completed, he is also responsible for rewinding the film, preparing the projector for, and returning it to storage. Students at the lower grade levels are not given the responsibility for being "audiovisual monitors."

One week later, prior to the scheduled arrival of the delivery truck, student monitors collect the media from each teacher. Media is returned to the "drop point." All films, in this case, are checked at the school by the driver before returning to the center. This assures the return of all films as specified in the original booking (details regarding this procedure are covered in the shipping section above).

A detailed description of two centers has provided an analysis of operations which demonstrate the duplication of functions, the mass of clerical operations which may be easily automated, and the need for relief from non-teaching activities. A flow chart (Figure 7) was constructed which represents the Alameda County Curriculum Materials Center procedures including:

> Acquisitioning - this process includes evaluating approval for purchasing, and purchasing of new titles. When determination is made on the needs for new titles, the administrator will establish a schedule for receiving previews and having committees evaluate the pertinent titles. Following the evaluation, a selection is made for titles to be purchased. This list of titles


EVALUATE AND PURCHASE
RECEIVE NEW FILM AT THE CENTER
ROUTE FILM TO INSPECTION AREA
ATTACH LEADER AND TRAILER
PRINT-CODE FILM CAN STRIP
ATTACH TO FILM CAN LID EDGE
ATTACH CIRCULAR LABEL TO LID
PLACE FILM ON MOVEABLE CART
ROUTE TO STORAGE AND FILE
ASSIGN ACCESSION NUMBER
COMPLETE INCORPORATION FORM
COMPLETE INVENTORY CARD
CHECK AGAINST PURCHASE ORDER
ANNOTATE FILM GRADE LEVEL & SUBJECT
CLEAR PURCHASE ORDER FOR PAYMENT
ROUTE TO CATALOG CLERK
IMPRESS ONE PLATE FOR EACH SUBJECT LISTING
IMPRESS INFORMATION ON PLATES
RUN PROOF CARDS
EDIT AND CORRECT
STAMP WITH GRADE LEVEL FILE
MAKE CARDS FOR VARIOUS FILES
COORDINATORS FILE
INVENTORY CARD
SOURCE FILE CARD
MASTER CATALOG FILE
BOOKING REFERENCE FILE

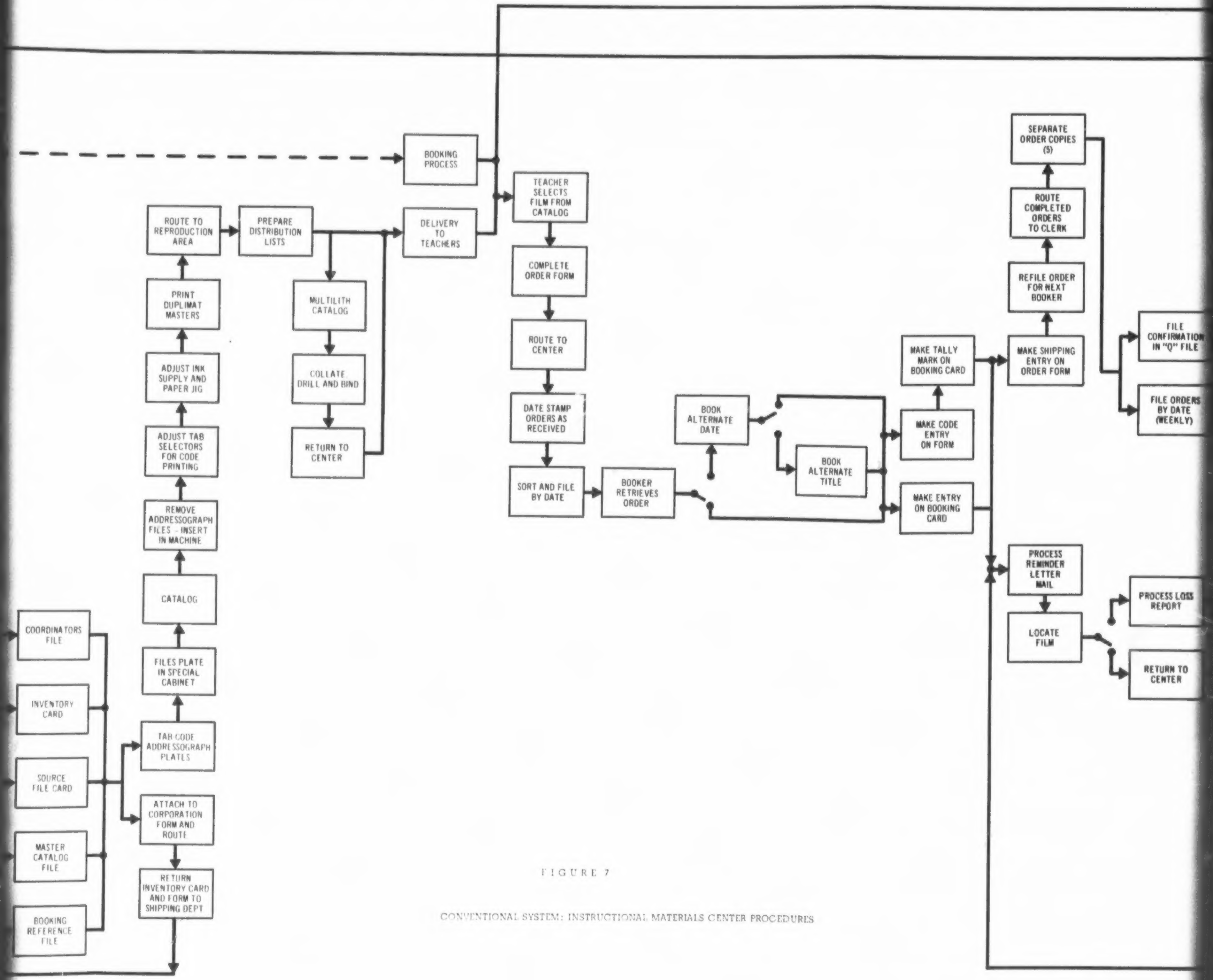
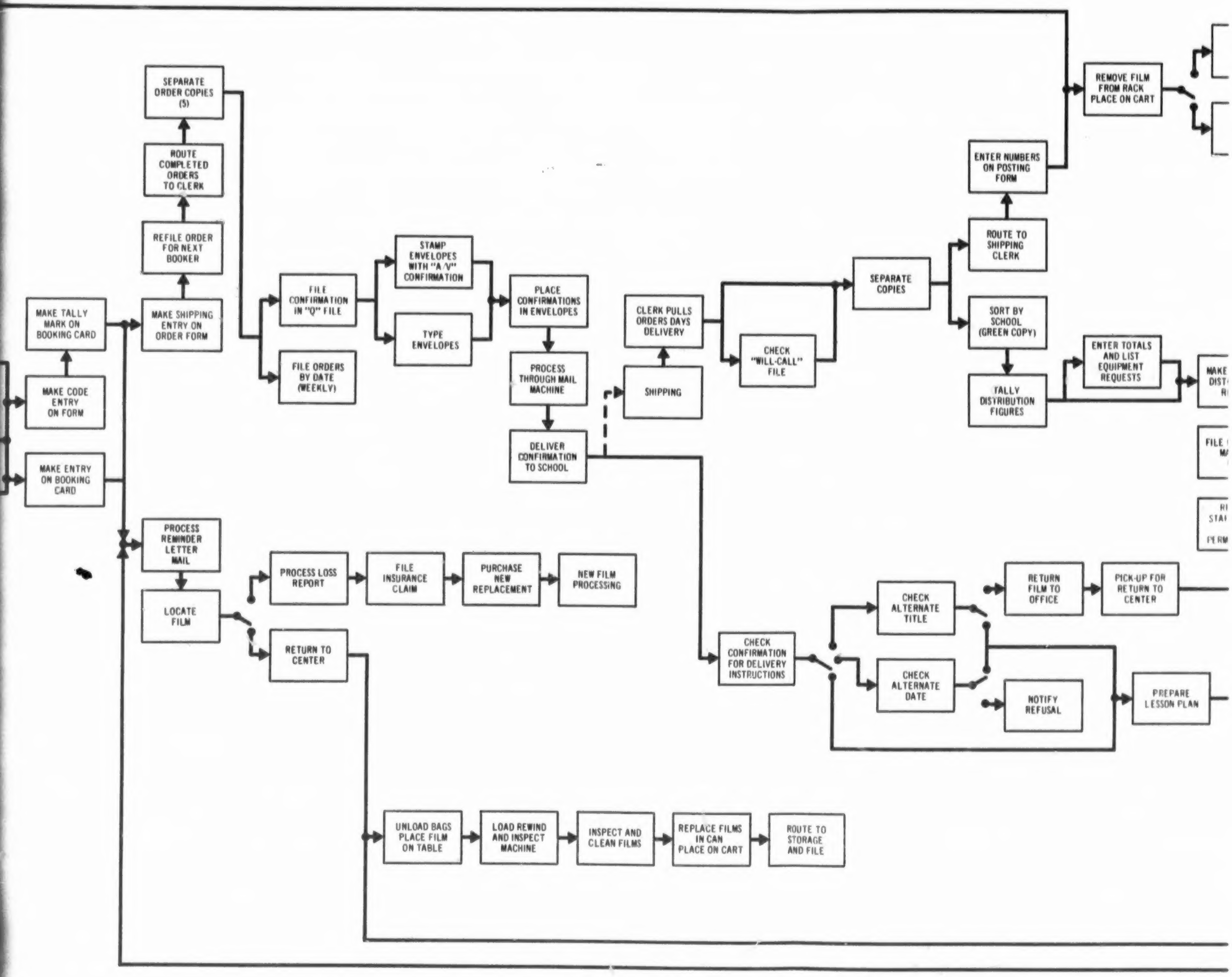
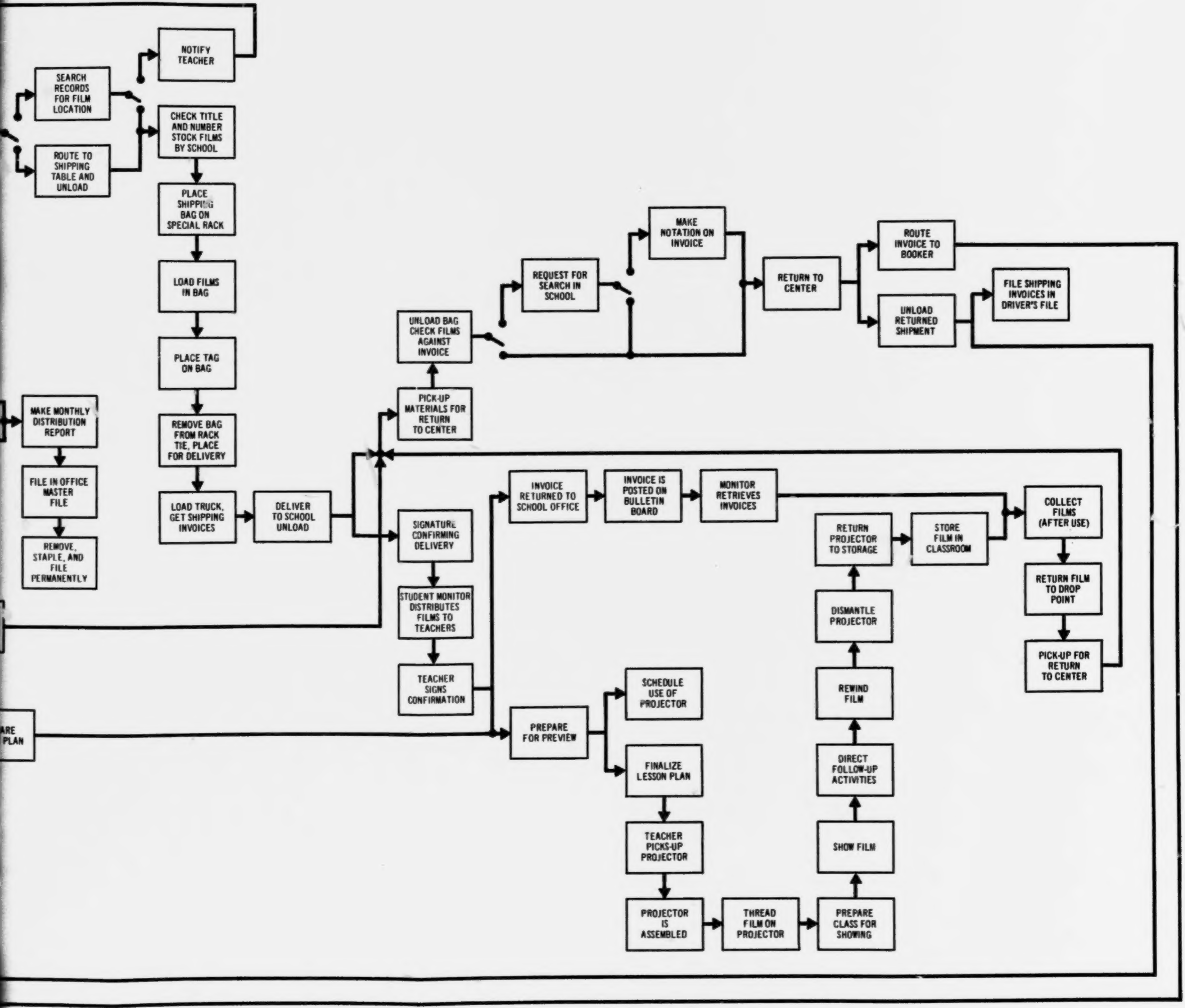

BOOKING PROCESS
DELIVERY TO TEACHERS
ROUTE TO REPRODUCTION AREA
PREPARE DISTRIBUTION LISTS
PRINT DUPLIMAT MASTERS
ADJUST INK SUPPLY AND PAPER JIG
ADJUST TAB SELECTORS FOR CODE PRINTING
REMOVE ADDRESSOGRAPH FILES - INSERT IN MACHINE
CATALOG
FILES PLATE IN SPECIAL CABINET
TAB CODE ADDRESSOGRAPH PLATES
ATTACH TO CORPORATION FORM AND ROUTE
RETURN INVENTORY CARD AND FORM TO SHIPPING DEPT
COORDINATORS FILE
INVENTORY CARD
SOURCE FILE CARD
MASTER CATALOG FILE
BOOKING REFERENCE FILE
MULTILITH CATALOG
COLLATE DRILL AND BIND
RETURN TO CENTER
TEACHER SELECTS FILM FROM CATALOG
COMPLETE ORDER FORM
ROUTE TO CENTER
DATE STAMP ORDERS AS RECEIVED
SORT AND FILE BY DATE
BOOKER RETRIEVES ORDER
BOOK ALTERNATE DATE
BOOK ALTERNATE TITLE
MAKE TALLY MARK ON BOOKING CARD
MAKE CODE ENTRY ON FORM
MAKE ENTRY ON BOOKING CARD
MAKE SHIPPING ENTRY ON ORDER FORM
REFILE ORDER FOR NEXT BOOKER
ROUTE COMPLETED ORDERS TO CLERK
SEPARATE ORDER COPIES (5)
FILE CONFIRMATION IN "O" FILE
FILE ORDERS BY DATE (WEEKLY)
PROCESS REMINDER LETTER MAIL
LOCATE FILM
PROCESS LOSS REPORT
RETURN TO CENTER

FIGURE 7

CONVENTIONAL SYSTEM: INSTRUCTIONAL MATERIALS CENTER PROCEDURES


MAKE TALLY MARK ON BOOKING CARD
MAKE CODE ENTRY ON FORM
MAKE ENTRY ON BOOKING CARD
SEPARATE ORDER COPIES (5)
ROUTE COMPLETED ORDERS TO CLERK
REFILE ORDER FOR NEXT BOOKER
MAKE SHIPPING ENTRY ON ORDER FORM
FILE CONFIRMATION IN "Q" FILE
FILE ORDERS BY DATE (WEEKLY)
STAMP ENVELOPES WITH "A/V" CONFIRMATION
TYPE ENVELOPES
PLACE CONFIRMATIONS IN ENVELOPES
PROCESS THROUGH MAIL MACHINE
DELIVER CONFIRMATION TO SCHOOL
SHIPPING
CLERK PULLS ORDERS DAYS DELIVERY
CHECK "WILL-CALL" FILE
SEPARATE COPIES
ROUTE TO SHIPPING CLERK
ENTER NUMBERS ON POSTING FORM
REMOVE FILM FROM RACK PLACE ON CART
SORT BY SCHOOL (GREEN COPY)
TALLY DISTRIBUTION FIGURES
ENTER TOTALS AND LIST EQUIPMENT REQUESTS
MAKE DIST R
FILE MA
R STA PERM
PROCESS REMINDER LETTER MAIL
LOCATE FILM
PROCESS LOSS REPORT
FILE INSURANCE CLAIM
PURCHASE NEW REPLACEMENT
NEW FILM PROCESSING
RETURN TO CENTER
CHECK CONFIRMATION FOR DELIVERY INSTRUCTIONS
CHECK ALTERNATE TITLE
CHECK ALTERNATE DATE
RETURN FILM TO OFFICE
PICK-UP FOR RETURN TO CENTER
NOTIFY REFUSAL
PREPARE LESSON PLAN
UNLOAD BAGS PLACE FILM ON TABLE
LOAD REWIND AND INSPECT MACHINE
INSPECT AND CLEAN FILMS
REPLACE FILMS IN CAN PLACE ON CART
ROUTE TO STORAGE AND FILE


NOTIFY TEACHER
SEARCH RECORDS FOR FILM LOCATION
CHECK TITLE AND NUMBER STOCK FILMS BY SCHOOL
ROUTE TO SHIPPING TABLE AND UNLOAD
PLACE SHIPPING BAG ON SPECIAL RACK
LOAD FILMS IN BAG
PLACE TAG ON BAG
REMOVE BAG FROM RACK TIE, PLACE FOR DELIVERY
LOAD TRUCK, GET SHIPPING INVOICES
DELIVER TO SCHOOL UNLOAD
MAKE MONTHLY DISTRIBUTION REPORT
FILE IN OFFICE MASTER FILE
REMOVE, STAPLE, AND FILE PERMANENTLY
ARE PLAN
MAKE NOTATION ON INVOICE
REQUEST FOR SEARCH IN SCHOOL
UNLOAD BAG CHECK FILMS AGAINST INVOICE
RETURN TO CENTER
ROUTE INVOICE TO BOOKER
UNLOAD RETURNED SHIPMENT
FILE SHIPPING INVOICES IN DRIVER'S FILE
PICK-UP MATERIALS FOR RETURN TO CENTER
SIGNATURE CONFIRMING DELIVERY
STUDENT MONITOR DISTRIBUTES FILMS TO TEACHERS
TEACHER SIGNS CONFIRMATION
INVOICE RETURNED TO SCHOOL OFFICE
INVOICE IS POSTED ON BULLETIN BOARD
MONITOR RETRIEVES INVOICES
COLLECT FILMS (AFTER USE)
RETURN FILM TO DROP POINT
PICK-UP FOR RETURN TO CENTER
RETURN PROJECTOR TO STORAGE
STORE FILM IN CLASSROOM
DISMANTLE PROJECTOR
REWIND FILM
DIRECT FOLLOW-UP ACTIVITIES
SHOW FILM
PREPARE FOR PREVIEW
SCHEDULE USE OF PROJECTOR
FINALIZE LESSON PLAN
TEACHER PICKS-UP PROJECTOR
PROJECTOR IS ASSEMBLED
THREAD FILM ON PROJECTOR
PREPARE CLASS FOR SHOWING

3

is submitted to the Board of Education for adoption. The film titles are purchased for inclusion in the center's inventory following the board's approval.

New Film Processing - when a new film arrives in the center, the staff will properly number and label the can, place leaders and trailers on the film, and prepare the necessary inventory, booking, and cataloging records.

Cataloging and Catalog Production - usually a "cataloger" is assigned to maintain an up-to-date filing system for catalog production. This process involves the compilation of data about films, preparing master listings, and supplying the catalog production facility all relevant data. Catalog production is usually accomplished by another division of the school organization or is produced by commercial printers.

Selecting and Ordering by the Teacher - the media catalog is usually the only resource provided the teacher from which he selects materials for classroom utilization. An order form is completed and routed to the center.

Film Booking - scheduling and receiving media for teachers is accomplished through the employment of a Wheeldex system and calendar card files for schedule notations. Few centers use computer processing which is radically different from the semi-automatic Wheeldex operation.

Shipping - preparation and packaging is completed for each day's delivery schedule to designated schools. Trucks are most commonly used for delivery and pick-up. In remote areas, the United States Mail is employed. Control systems during this distribution phase are incorporated to allow maximum safeguards which hopefully contribute to maximizing service to teachers. One center uses the "want-list" for titles not immediately located. (See detailed description above.)

Checking - a system of checking stock levels and losses is incorporated with the center's operation. Usually, this inventory occurs annually during the summer.

Maintenance - most centers inspect, clean, and repair every film when it is returned from the school. Automatic inspection machines are used which provide a measure of automation for this phase of work in the center.

Utilizing Films - the film is delivered to the school and in many cases student "monitors" are responsible for intra-school delivery and pick-up to classrooms. Many administrators, however, are overly cautious and will not allow student helpers. Teachers, therefore, are responsible for scheduling the projector, setting up for projection, and returning the equipment and film to the proper storage area.

Teachers are confronted with several barriers to effective utilization. Long-term scheduling from several weeks in advance of utilization to a full year schedule for selecting films provides an untenable pattern of utilization. It is also a great source of logistical error for study plans. This type utilization seemingly violates individualized learning needs, the "teachable moment" concept, and effort to integrate films as a meaningful learning experience.

Alternate dates for use of materials provide a philosophical trap which possibly states that films are not essential to the curriculum for which teachers are responsible. To provide the concrete learning experiences to students through media when necessary is a goal all centers hope to achieve. At best, those centers studied hopefully provide a partial service which is precisely integrated into teaching plans.

A booking clerk who provides alternate titles eliminates the teacher's function of choosing mediated learning experiences for his class. This clerical selection process is one that provides the greatest need and impetus for automating the procedures of a media center. Booking clerks usually will provide alternate film titles if the one requested by the teacher is not available. It is possible to conclude that this system, although acceptable to many professional people, should be eliminated. This provides the fodder to critics who are able to claim that the film is merely a frill.

The three concerns listed above relate to the teacher's role in selection and utilization of a film. The processes currently existing possibly leave little room for professional planning and teaching with film.

Computer Assisted Booking

Presently several media centers are undergoing the conversion of certain clerical procedures to automation. Syracuse University has conducted an experimental program for "on-line" booking with school systems in various parts of New York State. The system is designed to combine resources of several film libraries to assure delivery of a film to the person making the request.

During a recent visit to the King County, Washington, Instructional Materials Center, it was noted that on-line booking procedures have been completed using a centrally located county computer center. The system provides for a variety of print-out reports, catalogs, and immediate confirmation of bookings.

Familiarity was gained by visiting two California systems which also provide partial answers to problems of easy access to media: Los Angeles County Schools and Beverly Hills Unified School District. In the Los Angeles County Schools media center, Gerletti reported:

> Requests for materials were increasing at such a rate that it became obvious that the handling of orders using a wheeldex would soon become inadequate.[8]

Because the need for processing is in excess of 150,000 annually, it was necessary to convert to electronic data processing techniques in the Los Angeles County Superintendent of Schools Division of Educational Media. Performance of the following functions was necessary:[9]

- Furnish confirmations of requests to administrators and teachers.
- Furnish individual school shipping invoices.
- Furnish daily pull sheets to be used by shipping clerk to process order. (The term "pull" derives from the act of pulling a film from the rack.)
- Furnish audience reports for sponsored materials. (Materials on long-term free loan)
- Furnish quarterly reports of film usage by school district. (Print-out)

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[8] Robert C. Gerletti, "A Report of a Process Which Adapted Certain IBM Machines to the Booking of Films," (Revised), (Los Angeles: Los Angeles County Schools, 1964-1965).

[9] *Ibid.*

- Furnish quarterly reports summarizing film use data for mailing to each district.
- Furnish bio-data on each film, such as: title, code number, producer, etc.
- Furnish reports on requests not honored. Reasons include: withdrawn title, not available, and other reasons for inability to confirm the request.
- Furnish a method for continued booking after the initial data processing sequence. Phone orders and daily requests are filled following the initial total semester booking effort.

  NOTE: This procedure has recently been revised and is now part of the daily computer operation.

Information processing necessary for each of the above functions increased by an order of magnitude which would require considerable additional manual labor. This particular center needed a computer to maintain order and control in the booking process. Added to this mass of information, the center has adopted differing contractual arrangements with districts. Each utilization report, therefore, must include the variable for which the particular district contracts. (Appendix D7, D8)

Recent changes in the computer software will provide greater flexibility for generating more report data previously processed manually. (See Appendix D9, D10, D11.)

Coupled with the increased data processing functions is the flexibility in computer programming which allows easy conversion to on-line telecommunications capability. This system, designed by the county's data processing personnel, surely is the forerunner of an automated media distribution system.

Dial Retrieval

Beverly Hills Unified School District has designed a system for accessing films, filmstrips, videotape, and audiotape. Carrells are located in each of the school libraries. Group access to the material is provided by a dial system in many classrooms. The central facility includes local videotape production capability and off-air instructional television for software acquisition. Off-air programs, films, and other media used in the system, are generally cleared for closed circuit distribution.

Students use a catalog to request a particular program through the intercommunications telephone system. They are given a number code by a technician, and instructed to dial the program. The dialing function activates the equipment through a computer assisted switching mechanism, which displays the media at the carrell. Programs are loaded by student technicians.

A media distribution system such as Beverly Hills partially achieves the objective of individualized instruction. Mediated instruction is provided through dialing. Direction for the use of media must be preplanned by the teacher. Behavior goals or response sheets are necessary to direct the listening-viewing activity toward desired learning outcomes. Limitations in the system may derive from lack of sufficient material and complete randomness to media. Multiple channel capability is a needed strength to achieve the objectives of individualization. Facilities such as those located in Beverly Hills will be the sub-systems of the regional and state networks proposed in this study.

Summary

Two conventional media center systems were described. A city and county media center were selected to illustrate the similarities in the required services for instruction and to provide a description which demonstrated the magnitude of manual operations necessary to provide the services. The purpose of this approach was to define those procedures which could be easily converted to automation as much of the work in a media center is technical and clerical. Computer programming techniques would be able to provide some answers to the overriding difficulty confronting personnel in a media center. Results of the questionnaire revealed that the difficulty may not be quantity or quality of material, but the mechanical process of allowing for effective and efficient utilization.

Inroads are being made in easing the burden of hand processes. One automated system for booking is discussed which would enable future expansion of the system proposed in this study. Additionally, a distribution system, not totally automated, is described which utilizes audio and video programs to students through a dialing function at remote student carrells. These two partial automated systems are currently demonstrating reasonable and feasible methods of improving instructional services. To facilitate development in a complete automated system, it is necessary to define requirements for hardware and software. Those requirements are discussed in the next chapter.

CHAPTER V

SYSTEM SYNTHESIS

> . . . but I would not ignore the implications implicit in videotape over the next ten years, it's entirely possible that we'll see much more electronic media than you would imagine. Someday someone will take all that room full of equipment and get rid of it. When I look at the classroom today, I see something that makes me flinch. Teachers are given machines and reminded that they have them - so use them. By the time you get through she looks like a mechanic in a sports car factory. You're asking her to use several pieces of highly sophisticated equipment, only one of which will really talk to the other one, and each of which is apparently produced by somebody who hopes you won't even use the other ones. I've left out the TV set. I've left out of my ten years forecast much concern with ETV, have always felt it had enormous potential but that it's the only thing Ford has ever made that wouldn't run. Until someone solves the generator problem there there'll be trouble indefinitely. But when you put a TV set in a room you've got an enormous array of equipment. Funny thing is, that one last piece of equipment could do it all. A box, with a big screen in front of it, could project filmstrips, films, videotapes, sound, could retrieve from microform, (any of those images I was talking about), could also view TV, closed circuit, or broadcast, or any variation therof. Somewhere in the next ten years (ten may be too short) someone is going to start moving toward a single system, all purpose, communications instrument.[1]

An "all purpose communications system" is feasible with the use of current telecommunications developments.

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[1] Maurice Mitchell, "Who Shapes Education," Address at the School Library Workshop for Leadership Personnel, Monte Corona Conference Center, California, August 6-12, 1967. (Department of Education, Bureau of Audio-Visual and School Library Education).

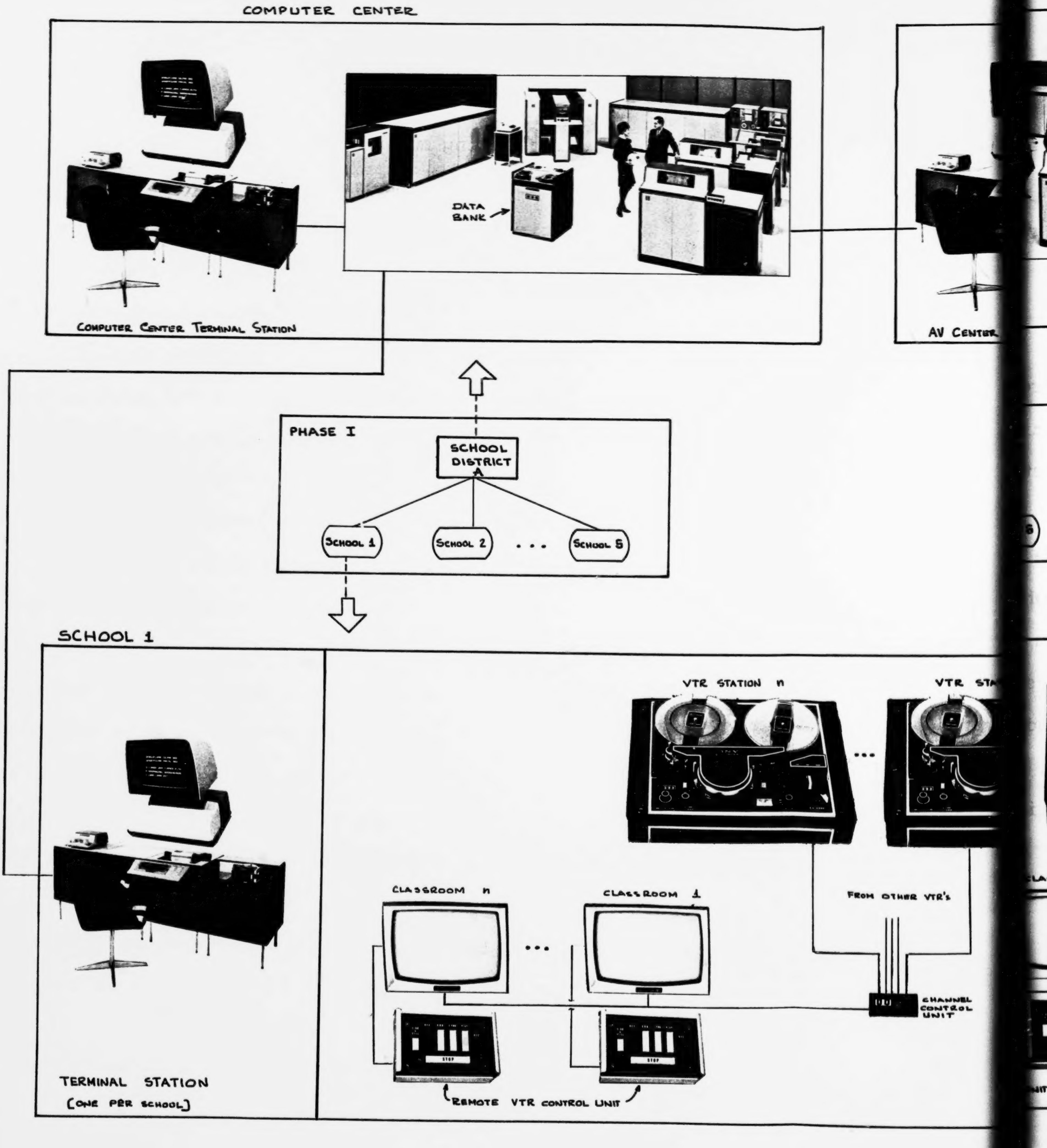
The synthesis of a system, which may provide the impetus for development, is described in this chapter. Because continual experimentation and revision will be necessary, a four-phase procedure is recommended. Equipment configurations for transmission and reception are illustrated for each phase. A pictorial representation of available hardware to implement the system appears in Figure 8.

The Proposed System - Objectives

The proposed system is addressed to the problem of making materials available for classroom use in the most expeditious manner possible. Two objectives which are essential to the proposed system are (1) acquiring motion pictures when precisely desired, and (2) providing the convenience for their utilization. The current bulk of work, as pointed out in previous chapters, which teachers must accomplish is almost beyond their endurance for effectively implementing a logistics of instruction consistent with the students' effective classroom learning experiences.

In an effort to define the requirements to provide films efficiently, the proposed system must incorporate elements of:

- Teacher acceptance and control
- Utility and ease in utilization
- Rapid access to data about media and media itself
- Distribution to all locations


COMPUTER CENTER
DATA BANK
COMPUTER CENTER TERMINAL STATION
AV CENTER
PHASE I
SCHOOL DISTRICT A
SCHOOL 1
SCHOOL 2
. . .
SCHOOL 5
6
SCHOOL 1
VTR STATION n
VTR STA
CLA
CLASSROOM n
CLASSROOM 1
FROM OTHER VTR's
CHANNEL CONTROL UNIT
STOP
REMOTE VTR CONTROL UNIT
NIT
TERMINAL STATION
(ONE PER SCHOOL)

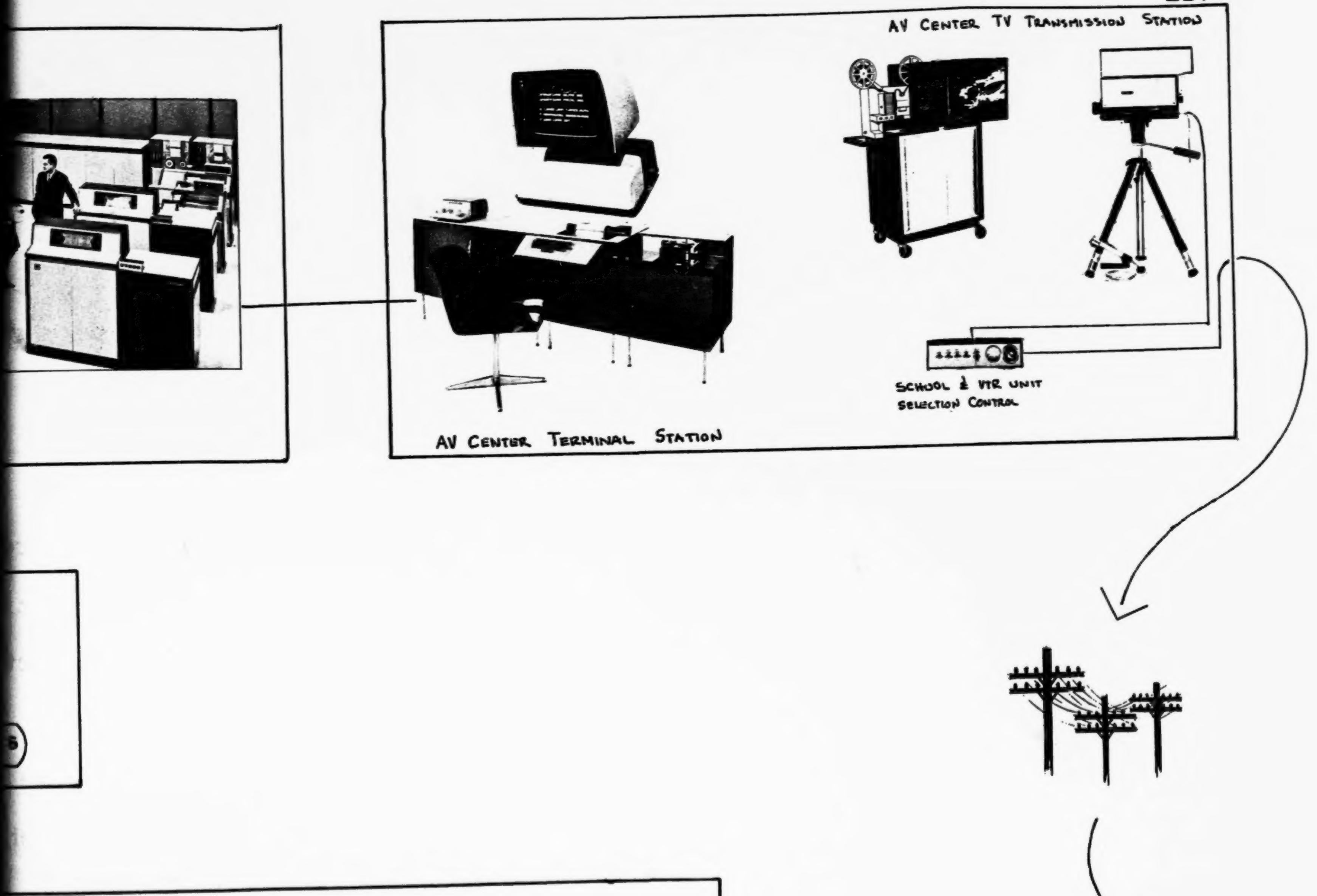

AV CENTER TV TRANSMISSION STATION
SCHOOL 1 VTR UNIT SELECTION CONTROL
AV CENTER TERMINAL STATION
6
VTR STATION n
VTR STATION 1
...
LASSROOM 1
FROM OTHER VTR's
CHANNEL CONTROL UNIT
STOP
NIT
VIDEO TRANSMISSION STATION

FIGURE 8
The Automated System:
Pictorial Schematic

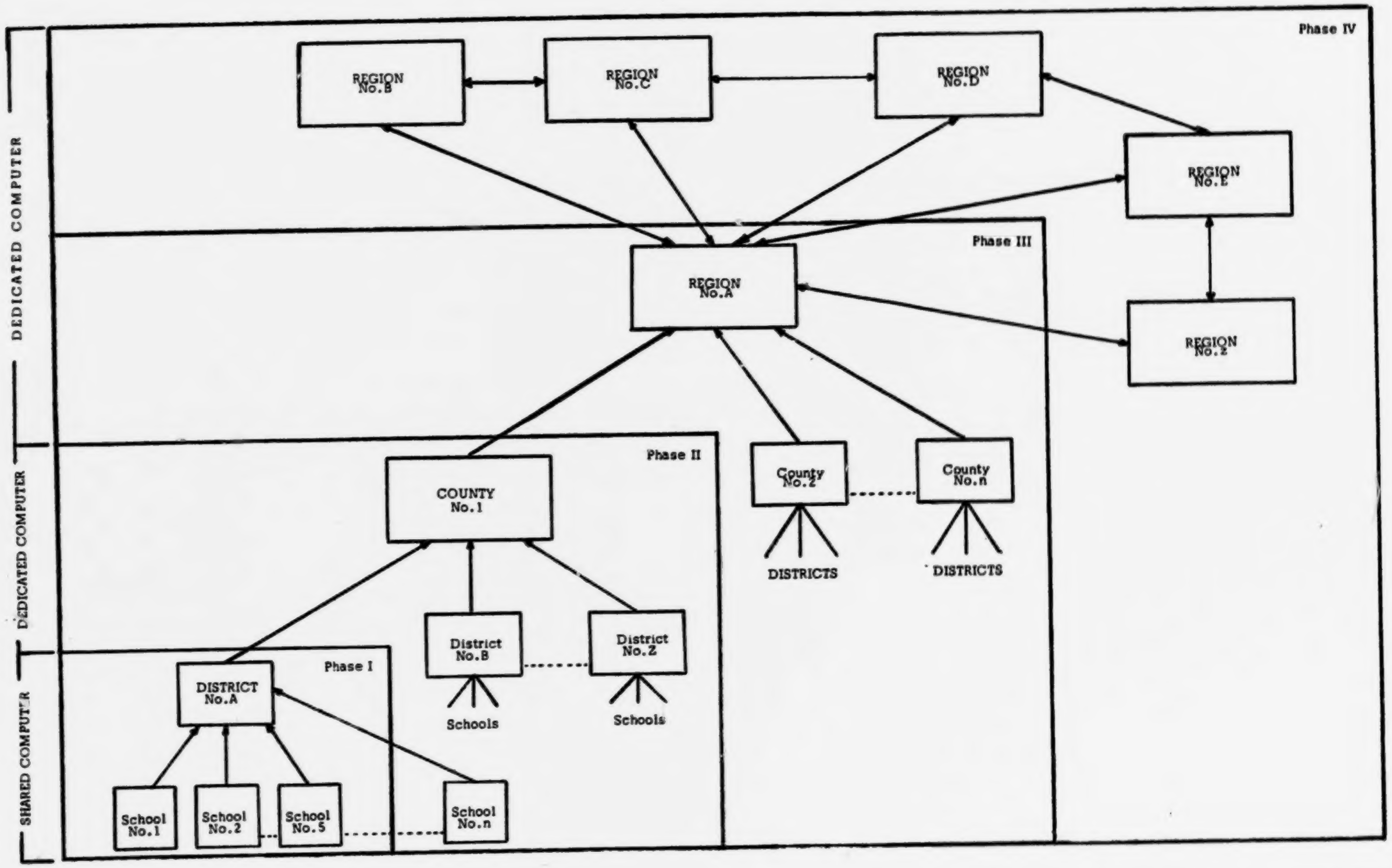
- Teacher ability to interrupt the sequence
- Eliminating manual processes with transfer capability to machines
- Ultimately providing economies in instruction and management
- Allowing the teacher the learning time efficiency lost in the mechanics of utilization

The proposed system will hopefully meet the described objectives and is feasible, utilizing the current state-of-the-art technology.

No major innovations are required. However, because of the magnitude of the project, it is proposed that a four-phase effort take place in the development of the system to allow an organized systematic growth pattern for the system, commencing in Phase I with a pilot installation and ending in Phase IV with the entire State of California School System tied into a network of Regional Media Distribution Centers. (Figure 9)

During Phase I all major system elements will be introduced:

- The pilot schools will have terminals installed to allow the teaching staff to have direct access to the computerized film data bank.
- A video tape recording system will be introduced at the pilot schools.


DEDICATED COMPUTER
DEDICATED COMPUTER
SHARED COMPUTER
Phase IV
REGION No.B
REGION No.C
REGION No.D
REGION No.E
REGION No.A
REGION No.Z
Phase III
County No.2
County No.n
DISTRICTS
DISTRICTS
Phase II
COUNTY No.1
District No.B
District No.Z
Schools
Schools
Phase I
DISTRICT No.A
School No.1
School No.2
School No.5
School No.n

PHASE I	PHASE II	PHASE III	PHASE IV
IA: . Pilot Installation Using Computer Terminals at 5 selected "control" schools. . Instructional Materials Catalog maintained in a computerized Data Bank at district (or county) level. IB: . Instructional materials center tied in via computer to district (or county) level. IC: . Introduce video tape distribution-utilization system. ID: . Introduce Dial-up Retrieval System.	. Expand coverage area to entire county and introduce color.	. Expand coverage to the regional level	. Expand regional coverage to allow inter regional communication via computer . Introduce inter-regional relay system.

FIGURE 9

FOUR PHASE SUMMARY OF AUTOMATED SYSTEM

- The present audiovisual instructional materials center will tie into the pilot schools via a computer terminal.
- The film distribution process will be integrated with a TV transmission system.

Phase II will provide expansion of the system from the local level, as implemented during the pilot phase, to the county level.

Phase III will continue the expansion of the system to a regional level.

Finally, Phase IV will culminate in a network interconnecting all the regions into an integrated state-wide system.

In the detailed description of the phases which follows, the reference to motion pictures may include all optically projectable media, such as 8mm and 16mm film, slides, film loops, transparencies, etc.

Phase I

Phase I consists of four sub-phases and is the pilot phase that will build the foundation upon which the state-wide media distribution network will be based.

During this phase, five schools in a participating school district will form the nucleus around which the proposed system will be developed. It is recommended that the make-up of the five schools be as follows:

- two elementary schools
- two junior high schools
- one high school

The above school profile will constitute a "control" segment against which the schools using the current audio-visual cataloging and distribution systems can be compared. The study of the comparative merits of the proposed system will examine not only the economic considerations but also the academic aspects; that is, are the educators making greater and better use of motion pictures under the new system as compared to the existing system?

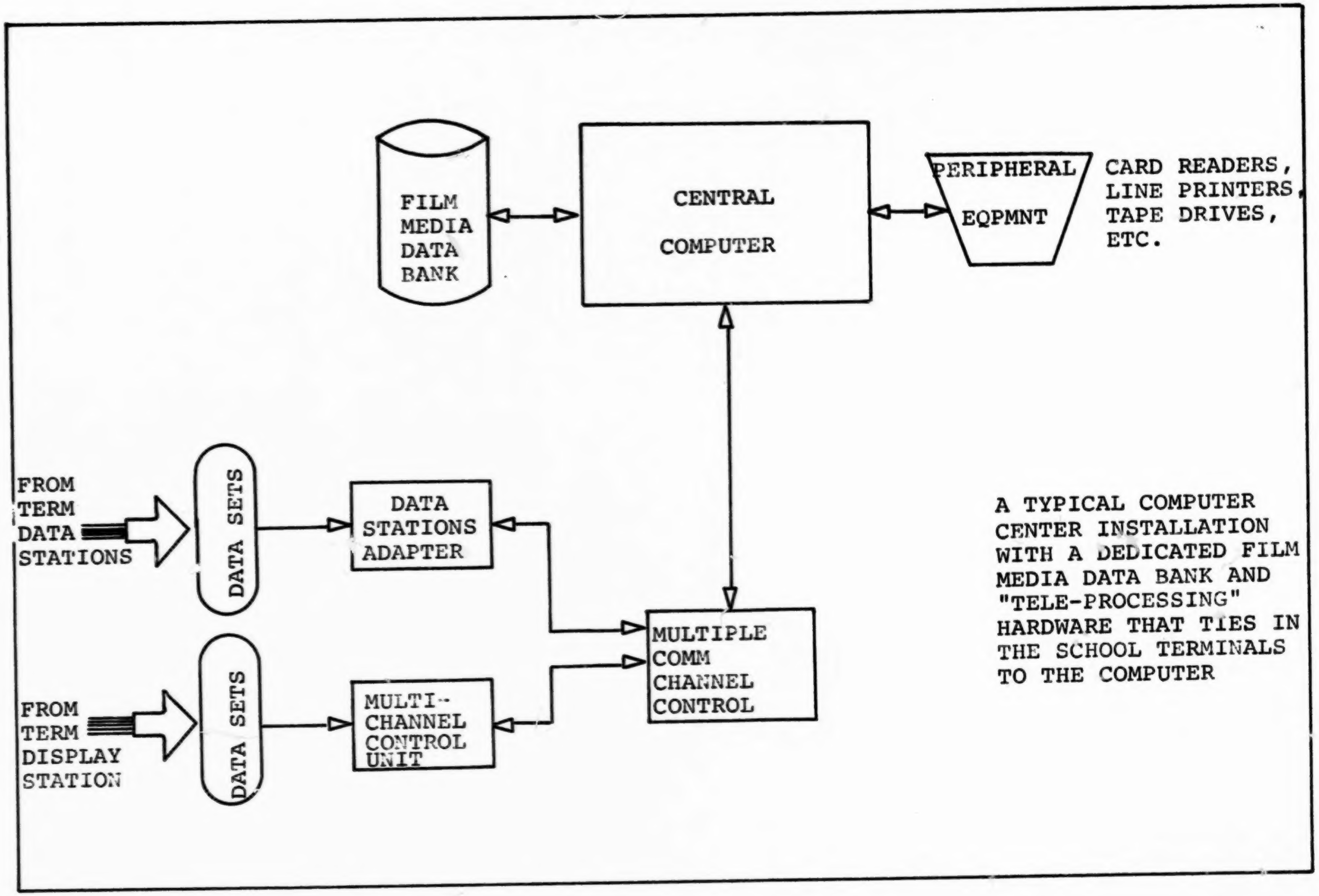
As was indicated in the previous chapter, the current systems of media cataloging, booking, and distribution, including improvements proposed in some of the current studies, do not meet fully the educator's requirements for integrating films into regular class programming. However, even though this system will solve most of the shortcomings recognized today, the magnitude of the system dictates careful analysis before entering upon the ultimate installation of a state-wide automated film distribution network.

Sub-phase I-A

Sub-phase I-A initiates the project by introducing to each of the pilot schools a computer terminal station. The terminal station will include the following hardware: (Figure 10)

- A video display unit with a capacity of twelve lines of sixty-four characters each.
- A line printer with a printing speed of ten characters per second.
- A keyboard (similar to a typewriter's) that can be used in either of two possible modes:
  - as part of the display unit to allow the educator to establish a "dialog" with the computer; that is, the educator uses the keyboard to input information or answers to computer queries and the computer uses the scope to communicate with the educator.
  - as part of the line printer unit to allow the educator to use the printer as a regular typewriter to annotate computer printed information as well as to communicate with the computer directly in a similar fashion used with the display scope.
- An optional card reader that can be used as a secondary input device to enter required data into the computer via a punched card.
- Appropriate Control Units and Data Sets to connect the terminal to the computer via telephone lines.

The five school terminals will be connected to the computer (Figure 11) in operation at the pilot school


FILM
MEDIA
DATA
BANK
CENTRAL
COMPUTER
PERIPHERAL
EQPMNT
CARD READERS,
LINE PRINTERS,
TAPE DRIVES,
ETC.
FROM
TERM
DATA
STATIONS
DATA SETS
DATA
STATIONS
ADAPTER
FROM
TERM
DISPLAY
STATION
DATA SETS
MULTI-
CHANNEL
CONTROL
UNIT
MULTIPLE
COMM
CHANNEL
CONTROL

A TYPICAL COMPUTER CENTER INSTALLATION WITH A DEDICATED FILM MEDIA DATA BANK AND "TELE-PROCESSING" HARDWARE THAT TIES IN THE SCHOOL TERMINALS TO THE COMPUTER

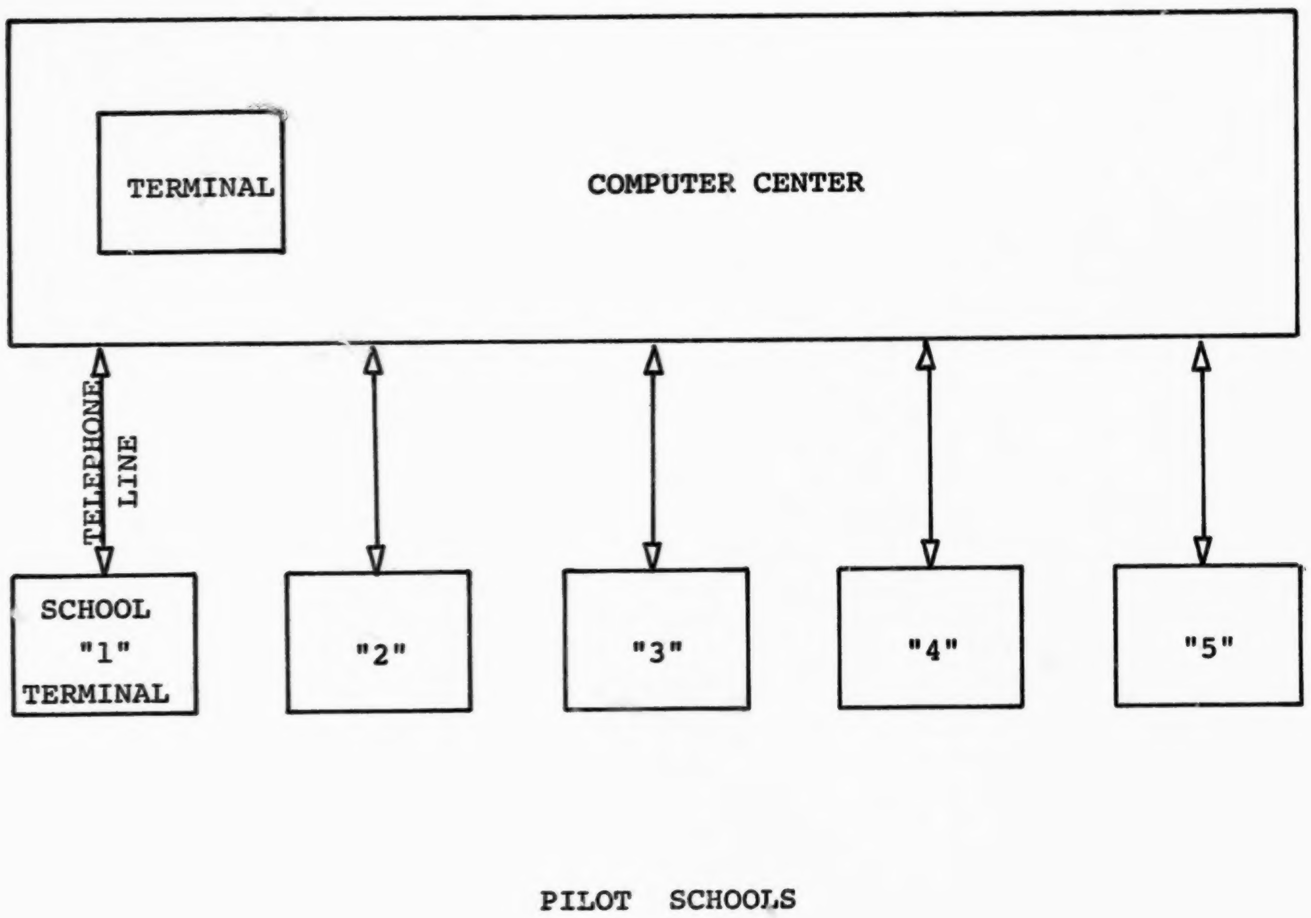
FIGURE 1

district. The computer center will have to include the following additional equipment, which will be required to allow the planned teleprocessing function to take place:

- A terminal will be added at the district or regional computer center. This terminal will, in all respects, be identical to the ones installed at the pilot schools, except that the data sets and the phone lines will not be required.
- The function of this terminal will be to allow the staff and the educators at the district level to have the same access capability to the system as the five pilot schools.
- The required multiple channel communications controller to allow the terminals to be tied into the computer.
- A dedicated direct access mass storage device to contain the media data bank (to be referred to from now on as simply the data bank).

With this equipment, when coupled with the required computer software, the system can now begin to function in a similar manner to be described below. (Figure 12)

The need for regular distribution of a printed catalog of the available film material will be eliminated. Instead, the educator will, via the terminal, communicate with the data bank which will contain a complete description


TERMINAL
COMPUTER CENTER
TELEPHONE LINE
SCHOOL "1" TERMINAL
"2"
"3"
"4"
"5"
PILOT SCHOOLS

SUBPHASE I-A

- Pilot Schools and Computer Center get terminals
- Educators have direct access from school terminal to the Film Media Data Bank

FIGURE 12

of all the film material,[2] together with utilization statistics and evaluation reviews for any material which has undergone a broad review process. The contents of the data bank will be kept current by inputting new information into the system via the punched IBM cards or via the computer center terminal; using it as an input device. The selection of the appropriate input mode to be employed for input of data will primarily depend upon the type of information to be input into the data bank.

Through a computer assisted dialog technique, the educator will communicate to the computer the subjects of interest, and other parameters, which will enable the computer to then search the data bank for the required material. The system will be such as to require NO prior programming knowledge by the educator. It is appropriate to repeat that the NICEM data bank and ERIC thesaurus may be employed as the standard for storage and retrieval.

Once the educator has conveyed the required information to the computer, the computer will then start to display upon the scope abstracts and other information and data about the material which satisfies the educator's previously specified needs and criterion.

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[2] Jerome D. Sable, "Language and Information Structure in Information Systems," *Dissertation Abstracts*, XXIV, No. 5 (November, 1963), 1964.

The educator can then decide which of the items are of interest and which are not. Those of interest can be booked right then and there, or the educator can request to have the items of interest printed out at the adjoining printer for his personal and future booking. In effect, each educator can have a customized catalog printed at will for his or her own personal use and containing only the selected audiovisual material. The hard copy printing capability allows the teacher a file of material for his use away from the computer system.

If the educator desires to check on what new film has recently been added to the data bank, the educator can request to see the information on the new material received as of the last time that the educator communicated with the data bank.

Since each new film added into the system will have an entry associated with it, the educator would only need to enter via the terminal the date of his last inquiry or the date of his last catalog listing. After listing, he will be able to trigger the system into selecting and displaying the new media received and entered into the data bank, since the indicated date. Should he also request a print-out of this material, he will, in effect, be generating the updates to his original catalog.

To book and schedule any desired film, the order would be placed using the terminal. The computer will respond immediately with either a confirmed booking for the requested date, or if a scheduling conflict exists, display the alternate availability dates. One can then either request the material for one of the alternate dates, or cancel the order if the new dates are not satisfactory. A further choice is provided by requesting alternate titles within the specified subject. Once, however, the desired film is booked, the computer will automatically take care of all the associated bookkeeping, including the update of the appropriate utilization statistics. The exact nature of the information, that is, the specific statistics and information which will be maintained on utilization of media, will be established during this sub-phase. It will also reflect the desires and needs of the present center's management.

Periodically, the computer center staff will request, via their own terminal, a listing of the booked materials, together with the information on the requesting teacher, school, and the confirmed scheduled dates. These periodic reports will enable the staff to inquire and retrieve almost immediately from the data bank a wide range of statistical summaries and tabulations that are required to meet their responsibilities in a more timely manner. The listing would then be forwarded by the school district to the center for processing of the indicated orders.

Sub-phase I-A is now complete. Some notable achievements toward the meeting of the basic objectives can now be observed:

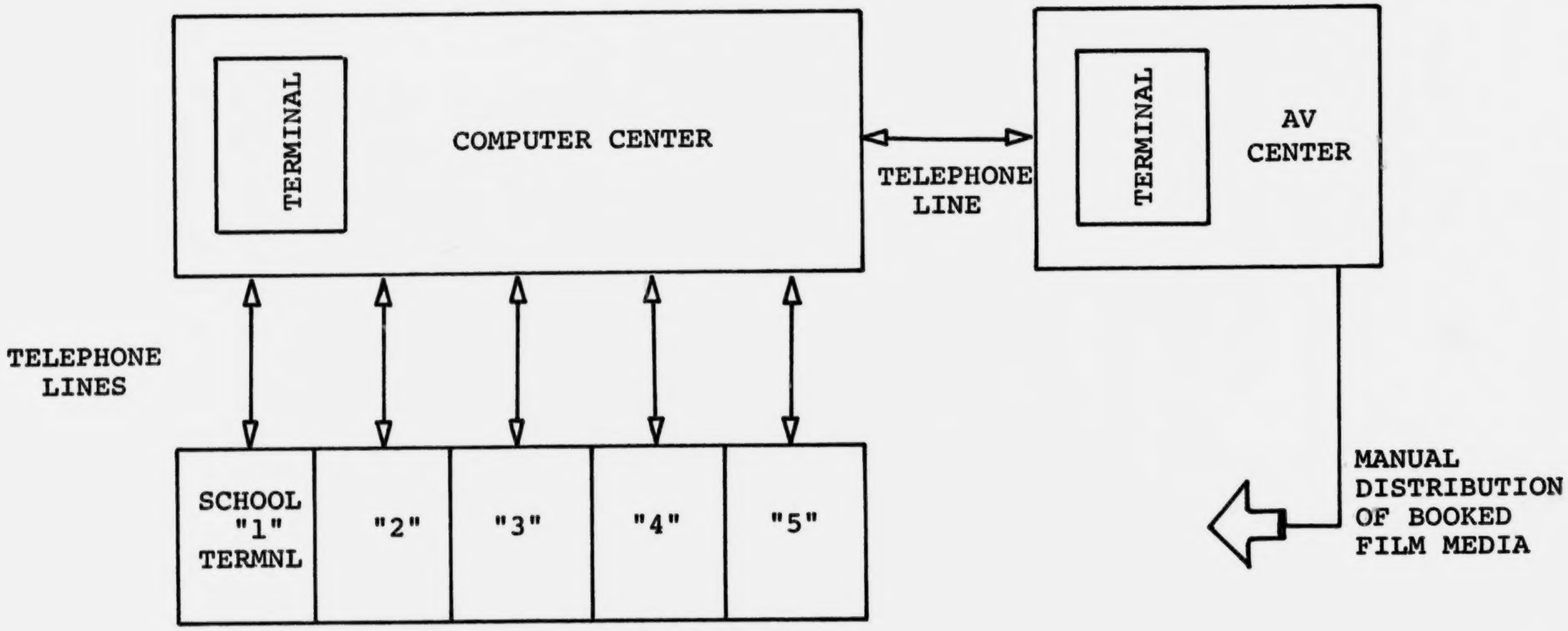
- Elimination of the need for the periodic publication of the film catalog.
- Timely knowledge of all new material received by the center.
- Exposure of the educator to the use of a computer terminal (a salient but important feature in exposing the educator to the power and use of the computer).
- Streamlining of the scheduling and booking process and the ability to process requests from five schools at one time.

Some of the present problems, however, will continue to remain. The film distribution operations will continue to function without change. The educator will still be faced with the pressures of a scheduled film return date, as well as having to be concerned with the appropriate projection equipment. The center will need to continue to check all the returned material for damage, and also be required to carry multiple copies of popular items to satisfy the demand.

Sub-phase I-B

During this sub-phase (Figure 13) the system will provide additional capabilities by tieing in the center with a terminal, thereby allowing direct and immediate contact by each of the five schools with the center itself. The data bank will be expanded to include film evaluation data and information about new films released, but not yet approved for distribution or contained in the film library.

In addition, the extended software capability will allow direct communication via terminals between the pilot schools and the center. Although this intercommunication capability may off-hand appear as unnecessary, since this function can be similarly accomplished by a telephone, the intent is to route the communication via the computer which would then "trap" certain pertinent information for future statistical tabulation. For example, each time a school requests an extension for keeping the film, the computer can tabulate this type of information. Should the center grant such an extension, the data bank would then automatically be updated making the film unavailable to other requestors for the additional period of time. Other similar capabilities will also be provided during this sub-phase, the exact nature of which will be determined in conjunction with the participating schools and centers.


TERMINAL
COMPUTER CENTER
TELEPHONE LINE
TERMINAL
AV CENTER
TELEPHONE LINES
SCHOOL "1" TERMNL
"2"
"3"
"4"
"5"
MANUAL DISTRIBUTION OF BOOKED FILM MEDIA

SUBPHASE I-B

- AV Center connected to Computer Center via terminal
- Schools can now communicate directly with AV Centers via their terminals

FIGURE 13

The extended capabilities of the system will simplify the clerical chores performed by the center for the five pilot schools.

One of the functions the terminal can now provide at the center is the ability of the center to use the terminal as a vehicle through which they can update the data bank with the multitude of statistics that are currently manually maintained. The center will also have the ability to inquire and retrieve almost instantaneously from the data bank a wide spectrum of information as required to meet their responsibilities in a more timely manner. (See Chapter IV.)

The major effort of phase I-B, however, will not be in the tieing of the center to the computer, but in the expansion of the software capabilities that will be required as a foundation for the subsequent expansions.

Sub-phase I-C

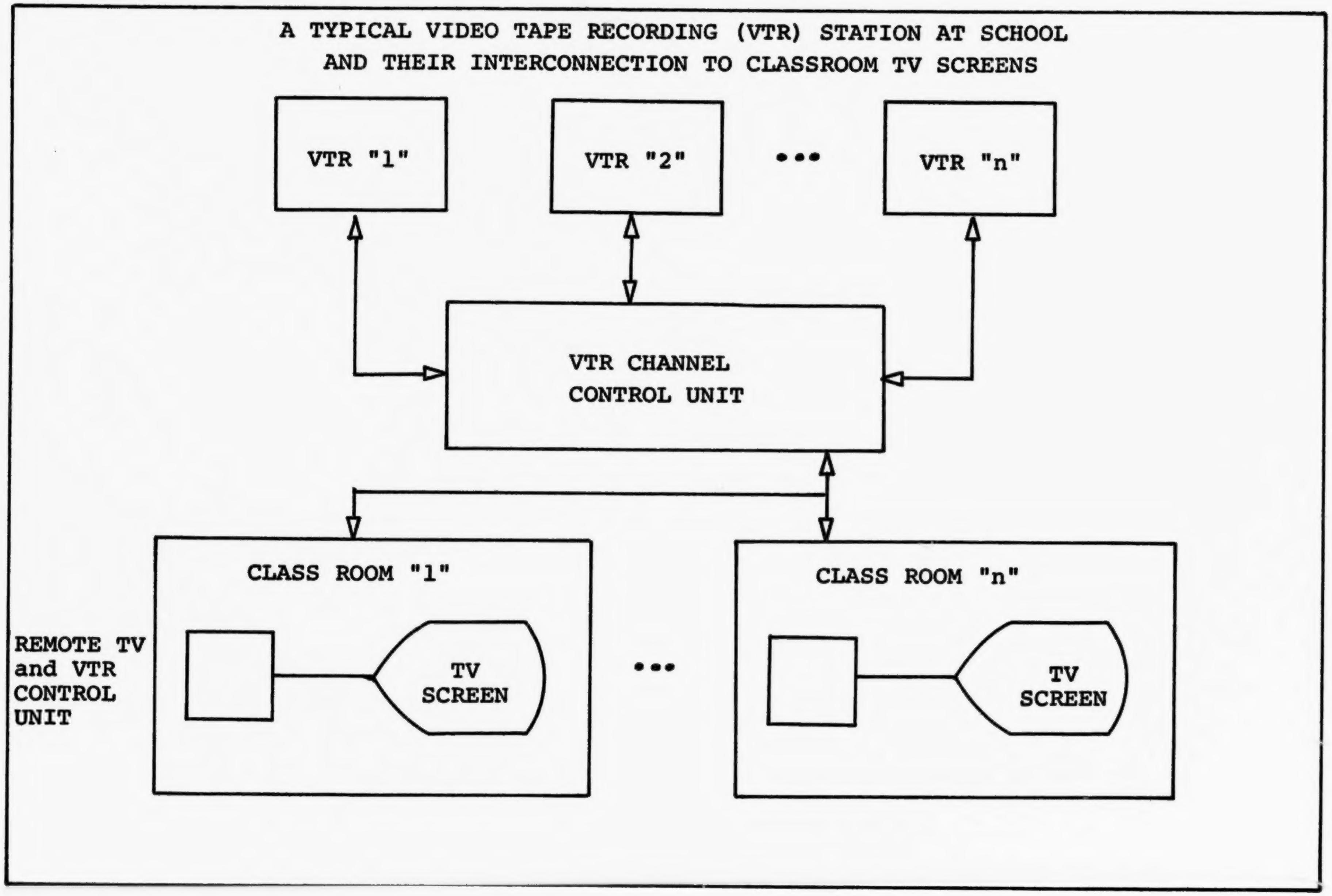
The total system is beginning to take shape. One can now make another extension in the system by introducing a new film distribution technique. The scope of participation in this sub-phase will continue to be limited to the first five schools. However, it will be possible at this time to start introducing the elements of Sub-phase I-A and I-B to other schools and districts as their prelude to Phase II.

The participating schools will have the following additional equipment installed at their facilities: (Figure 14)

- A number of videotape recorders (VTR), the quantity to be determined from film utilization statistics for each school as collected during Sub-phases I-A and I-B.
- A remote channel selector and videotape recorder control unit with the following features: (NOTE: It is assumed that the classrooms will already have television monitors installed in them.)
    - Ability to select any one of the videotape recorders.
    - Ability to stop and continue a video presentation at any time the educator so chooses.
    - Ability to back up and replay any portion of the video picture at either regular speed or slow motion.
    - Appropriate control equipment to connect the videotape recorders to the classroom television monitors.

At the same time, the center will have the following additional equipment installed:

- One or more film chains (the number to be determined during Sub-phases I-A and I-B).



A TYPICAL VIDEO TAPE RECORDING (VTR) STATION AT SCHOOL AND THEIR INTERCONNECTION TO CLASSROOM TV SCREENS

VTR "1"
VTR "2"
VTR "n"
VTR CHANNEL CONTROL UNIT
CLASS ROOM "1"
CLASS ROOM "n"
TV SCREEN
TV SCREEN
REMOTE TV and VTR CONTROL UNIT

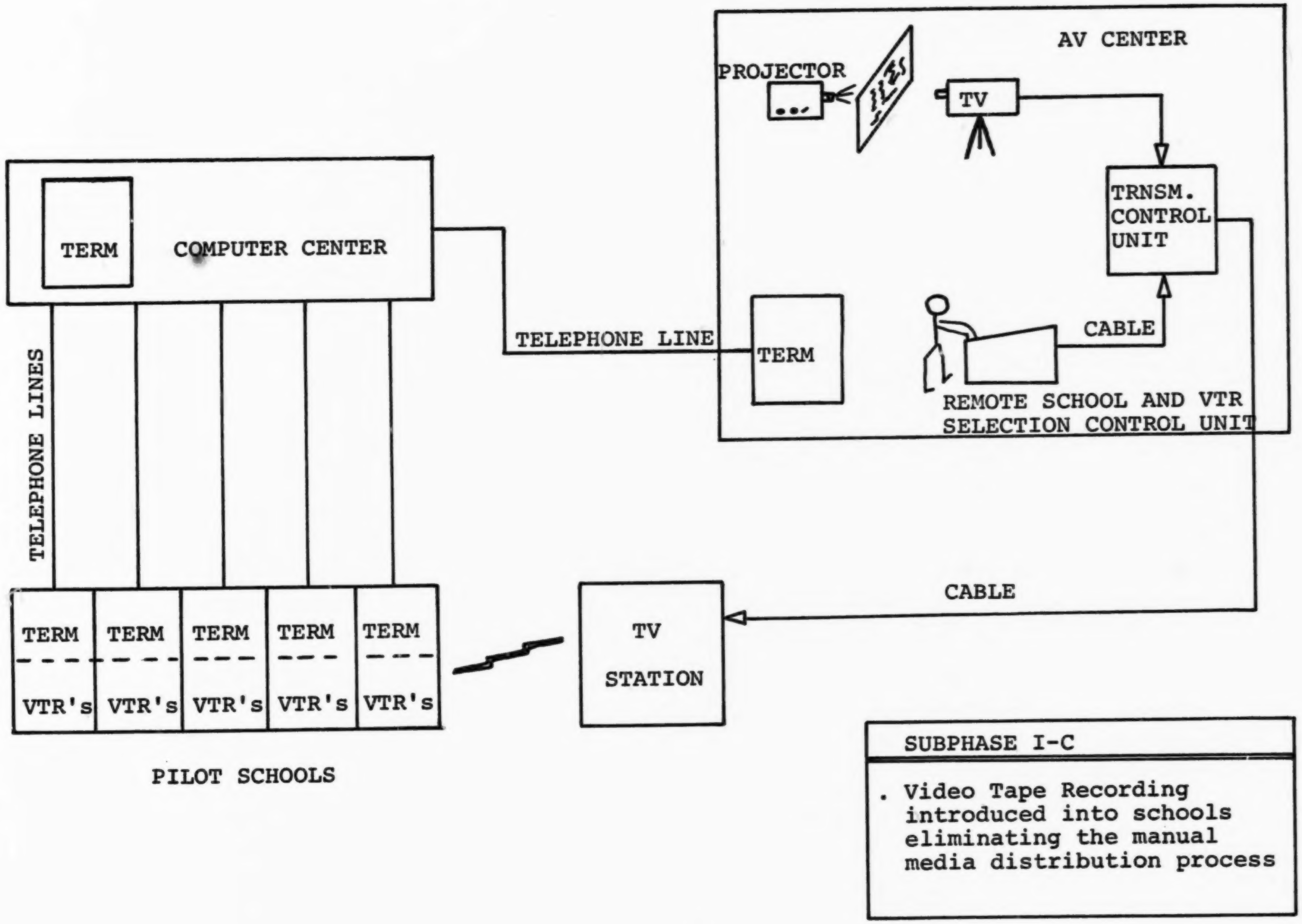
FIGURE 14

- A remote school and VTR selection control unit.
- A transmission control unit and cable, or microwave, connections between the center and the nearest participating educational television station (ETV).

With the described equipment installed and operational, it will now be possible to replace the manual distribution of films with a television oriented system. (Figure 15)

The educator will select and book the desired material as described earlier. Appropriate information about the booked film titles, the requesting school and teacher's name, the booking date, etc., will be transmitted by the computer to the center terminal.

During the hours that the ETV station is not transmitting to the public, the center will manually activate, via their remote control unit, a given VTR unit at the destination school and start the projection of the film media through the TV film chain. This film chain will transmit the images to the ETV station for retransmission to the destination school. Since the center concurrently activated a VTR unit in the destination school, the broadcasted material will be automatically recorded. Should it coincide that the same material was also requested by a second school, the center will also activate the VTR unit


AV CENTER
PROJECTOR
TV
TRNSM. CONTROL UNIT
CABLE
TERM
REMOTE SCHOOL AND VTR SELECTION CONTROL UNIT
TERM
COMPUTER CENTER
TELEPHONE LINE
TELEPHONE LINES
CABLE
TV STATION
TERM
VTR's
TERM
VTR's
TERM
VTR's
TERM
VTR's
TERM
VTR's
PILOT SCHOOLS

SUBPHASE I-C

. Video Tape Recording introduced into schools eliminating the manual media distribution process

FIGURE 15

in the second school and thus enable a single transmission to satisfy both school requirements at one time.

When the video transmission is over, the recorders will be turned off by manual intervention via the remote control unit at the center. During a subsequent phase, this function will be fully automated. In a manner similar to the one described above, other requests will be satisfied. Each time the center activates a different VTR unit at the appropriate school, until all the requests have been satisfied.

Upon conclusion of all the video transmission, the center will communicate via the terminal to the central computer that all the booked film media has been transmitted. The center will also indicate which VTR unit in a given school contains the videotape recording of the booked film title. (The center, at this point of the system development, is the only party that has knowledge of which specific VTR unit was activated during the night to receive a given video transmission.) The central computer will then automatically type out at the different school terminals the media titles that were recorded by the different VTR units, together with the name of the requesting teacher.

Upon arrival at school, the teachers who have had film videotaped during the night will be notified that their videotape is ready for use. If a teacher desires to present the material that same day, the videotape needs only to be rewound and is ready for play-back. Otherwise, the staff will store the videotape until such time that the teacher will request it to be mounted for replay to the subject class. Further facilitation of this process will occur if the engineering design includes automatic rewind and same day replay by the teacher.

The educator will have full control, through the remote VTR control unit located in each classroom, over the video transmission. At will he may commence the transmission, interrupt it for class participation, or replay some of the material at regular speed or slow motion to re-emphasize an important section of the film.

Should the educator desire to save the videotape for subsequent use in a different class, he can do so; otherwise, he would normally release it into open stock for reuse during the following night's transmission.

At this stage of the system development, some additional new achievements can now be observed:

- Elimination of the manual distribution system of the film. This should greatly reduce the cost of handling the film and preserve the film life by an order of magnitude. The replacement problem is virtually eliminated.
- There is no longer a need (once all the schools serviced by the center are tied in) to maintain multiple copies of popular material in order to

satisfy the demand. Since the center uses the same film copy to transmit the video picture to any and all requesting schools, a single copy is sufficient to service all those participating.

- The educator now has attained the goal of having the material presented to the students when they are of greatest instructional value - at the peak of their learner readiness as determined by him. The projection rate can be paced in accordance with the ability of a class to absorb the material.
- There is no longer any pressure to return the material by a certain date. If the educator wishes to delay the presentation by a week, he can do so at will.
- The time lapse between the time the educator selects the film and the time it can be projected at the monitors is simply "overnight."
- Educators no longer need to compete for access to a single copy of the desired material. There are no more disappointments if sufficient copies are not available to satisfy each request for use.
- It is obvious that because of the easy access to the film and because of the facility with which the educator can be kept fully abreast of all new materials, he can, and will, use the available

material much more effectively and more frequently.

Most of the key features of the system have by now been implemented and realized. However, many benefits offered by such a system in the area of audiovisual instruction will not come to bear until the rest of the phases are implemented. These phases will serve to:

- Continue to automate further some of the functions described earlier.
- Continue to expand the computer software to further augment the existing capabilities.
- Continue to spread the network until a state-wide system is in existence.

However, before the integration of the other schools into the network can commence, the capability to transmit a large volume of film to the requesting schools must first be provided. A step in this direction will be to automate further some of the manual functions performed at the center.

Sub-phase I-D

There are a number of possible approaches that can be employed to increase the transmission volume capacity to a level sufficient to cope with the possible demands that could be imposed upon the system by the ever-growing number of participating schools.

One such approach would be to contract with commercial stations to transmit the video image to schools during their "off-hours." This would require additional hardware at the center to allow the center to automatically direct the film image being picked up by the film chain to any one of the participating stations. In this case, the center can simultaneously employ as many TV cameras for pick-up as there are participating stations.

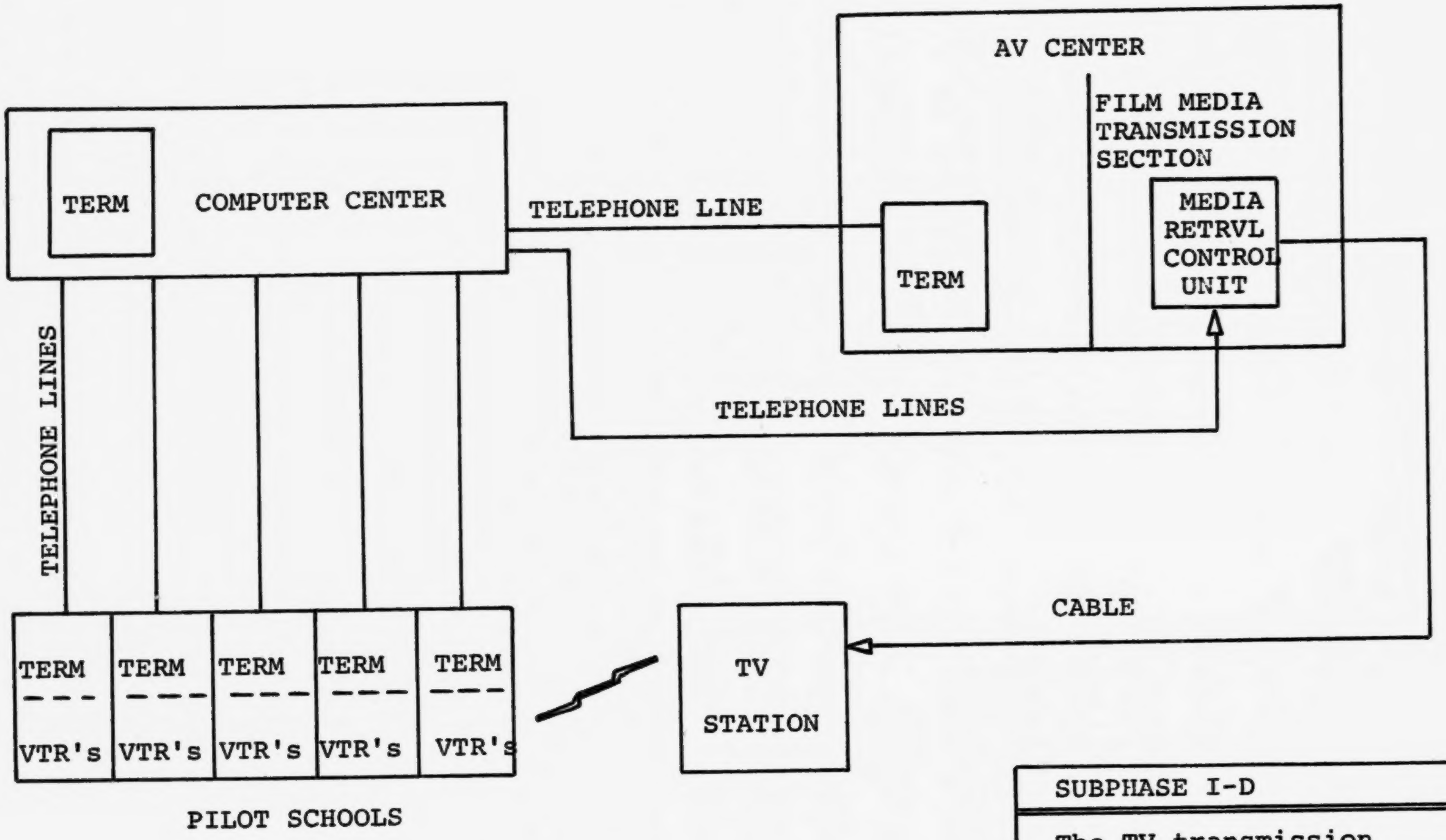
This alternative is probably the most economically feasible one, since when coupling with the ETV network the available commercial TV stations, there will probably be sufficient capacity available to provide fairly consistent overnight service. However, due to sporadic peaks in utilization, it is possible that the capacity will at times be inadequate. It may then take two to three days between the time the educator schedules and books the film, and the time the video tape of the film is available at the school.

Overnight service will still be possible, even during these peak periods, through the use of a priority scheme that will be introduced into the computer software package. The system will be designed in such a manner that an educator can always get overnight service, if he so desires. Normally, one would plan ahead to some degree the film to be used in the class. Since there is no longer the pressure to return the material, there is no reason to believe that overnight service will be demanded at all times by all the users.

The second alternative approach that may be considered is the community antenna TV transmission system or the 2500 MGHZ band range. Initially, these distribution systems may be more costly, since most of the hardware in the schools, at the center, and at the transmitting stations will have to be adapted for its use. At this point of analysis, it is difficult to evaluate the advantages to be gained in the employment of this approach. In any case, there are feasible avenues available to expand the transmission capacity.

Concurrently, to automate further the manual functions performed at the center, an automatic dial-up film retrieval system will be introduced (Figure 16). In this system there would be facilities where many 8mm or 16mm film chains, videotape recordings, slide chains, and other similar audiovisual material would be available for picking up sound and pictures.

The dial-up system would be either completely computer driven, or at least interface with the computer. Based upon the daily requests processed by the system, the computer will activate the proper TV camera for transmission, activate the dial-up system to retrieve the appropriate film, and control the routing from the center to the


AV CENTER
FILM MEDIA TRANSMISSION SECTION
MEDIA RETRVL CONTROL UNIT
TERM
COMPUTER CENTER
TERM
TELEPHONE LINE
TELEPHONE LINES
TELEPHONE LINES
CABLE
TV STATION
TERM
VTR's
TERM
VTR's
TERM
VTR's
TERM
VTR's
TERM
VTR's
PILOT SCHOOLS

SUBPHASE I-D

- The TV transmission capacity expanded to cope with increased school demands
- A "dial-up" type of media retrieval system introduced

FIGURE 16

selected TV re-transmission station, lastly to the appropriate VTR unit in the destination school.

Phase II

As previously indicated, this phase, as well as the rest of the phases, will primarily provide an organized growth pattern to the envisioned system.

During Phase II (Figure 17), the following system expansions are planned:

- The number of schools participating will be increased to include all the schools in the pilot county.
- The computer requirements which were previously being shared in the pilot district will have expanded sufficiently at this point to warrant a dedicated computer installed at the county level.
- A dedicated computer devoted entirely to the film distribution system is necessary because of the great increase in the number of participating schools.
- The data bank will be greatly expanded to include all the films available from any of the existing centers in the entire county.
- The software capability will be expanded to include all the film review committee functions.

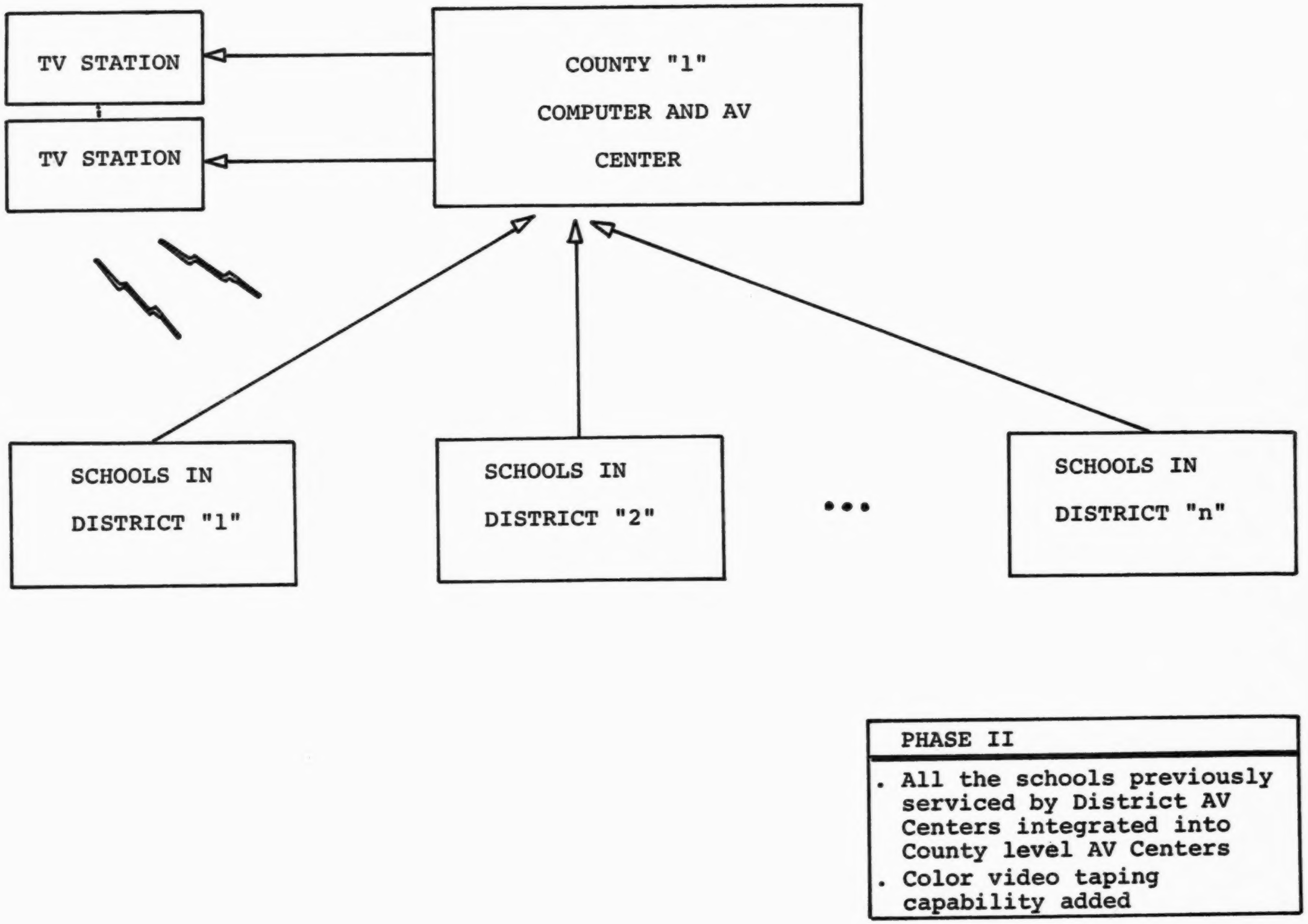

TV STATION
TV STATION
COUNTY "1" COMPUTER AND AV CENTER
SCHOOLS IN DISTRICT "1"
SCHOOLS IN DISTRICT "2"
SCHOOLS IN DISTRICT "n"
PHASE II
. All the schools previously serviced by District AV Centers integrated into County level AV Centers
. Color video taping capability added

FIGURE 17

The data bank will be expanded to include the evaluation reviews of all the participating boards. If a specific district wishes to review a given film, it can, via the terminal, find out if this film was previously reviewed, by whom, and the results of the evaluation. It can further find out, again via the terminal, the utilization statistics and usage patterns to establish whether the film is universally well regarded, or only by a specific district, or even only by a specific school. Such information interchange should greatly augment the review committee's ability to screen a greater number of films. With the computer-aided analysis, they can eliminate those films which have universally poor reviews, or very poor utilization statistics. The value of such information will become even more effectively felt when the network will spread in Phase IV to cover multiple counties at a regional level.

- During Phase I the local center was employed to transmit the film to the pilot schools. However, one of the many advantages offered by the proposed system is the capability to utilize a media center. As such, a center will be employed to service the entire county. This main center will handle all the projectable instructional materials that can be re-transmitted via the TV network previously described. The existing centers will continue to handle the remaining material - records, dioramas, models, globes, maps, artifacts, etc. - which cannot be handled by the main center.

- Since there will now be a substantial reduction in the activity for each of the remaining centers, it certainly should be possible, at this time, to increase the professional services of administrators. In-service activities relating to development and use of media, the processes of planning, and the development of specialized media for instruction become an increasing responsibility. Teachers and instructional technologists will be able to develop a logistics of instruction using a systematic procedure for the development of curricular experiences.
- The videotaping hardware will be augmented to allow color programming. The VTR units will be modified to enable the taping of colored video transmissions. Color is currently available, but may be economically prohibitive during the early phases. Color capability is necessary because there are certain subjects, the treatment of which

by the film greatly depends upon its full use of color. Therefore, it will be required that each school be provided TV monitors capable of receiving color-video images.

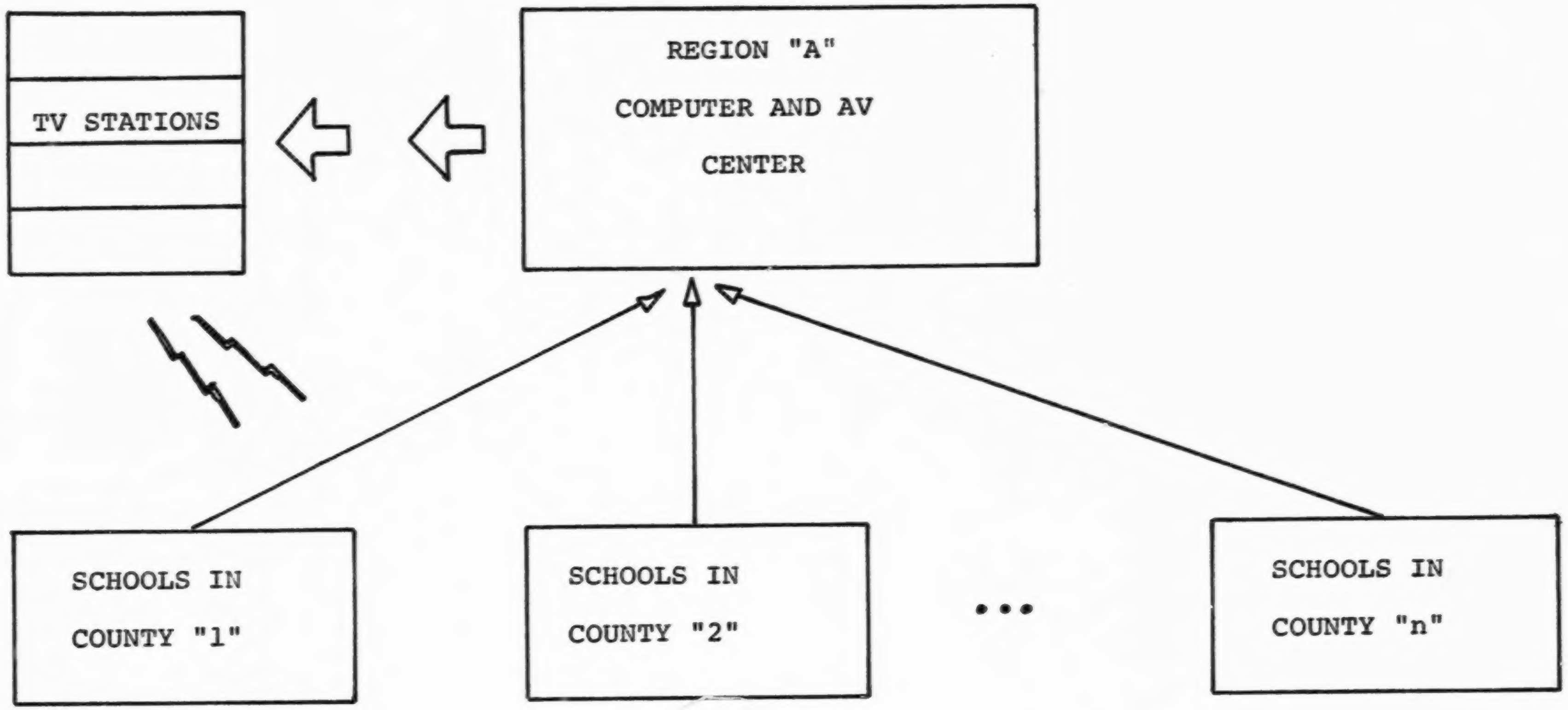
Some additional new achievements being realized through the use of this system at the present state of its growth cycle may now be reviewed:

- All films currently scattered in a number of media centers in the county will be centrally located and controlled.
- Only single copies of all new material need be purchased, greatly reducing the inventory cost as well as the material maintenance costs.
- Each school in the county will have an equal opportunity to access and receive, with unmatched facility and speed, any projectable instructional material reposing at the center. Equitable treatment will be had by all, from the largest urban high school to the smallest remote school.

Phase III

Phase III (Figure 18) will continue the expansion of coverage from the county level to the regional level.

During Phase III, the functions being performed by the computer at the county level will be taken over by one larger computer at the regional level. Each region will


TV STATIONS
REGION "A" COMPUTER AND AV CENTER
SCHOOLS IN COUNTY "1"
SCHOOLS IN COUNTY "2"
...
SCHOOLS IN COUNTY "n"

PHASE III

- All the schools previously serviced by County AV Centers integrated into Regional level AV Centers

FIGURE 18

service a number of counties. The actual number of counties covered by a region will be not only a function of the number of schools serviced, but will also be based upon a careful analysis of bookkeeping statistics that the data bank has been maintaining all along. A reasonable estimate, at this time, of the number of required regions is a probable minimum of six and a maximum of ten. However, the twelve regional data processing centers may provide a pattern upon which the distribution system may be organized.

The data bank will of course greatly expand during this phase, for it will now assimilate information about media titles carried in inventory by every center encompassed by the region.

All the county centers will now be combined into one single regional center. The operational budget for such a center would probably be lower than the combined individual budgets of the member counties. A detailed economic evaluation will be part of the overall Phase I effort.

The many benefits previously discussed are magnified in the following ways:

- The available media to any school in the region is now equivalent to the combined inventories of the materials previously carried by the different county or city centers.

- The replacement costs will be reduced to almost zero, and the new acquisition costs will be considerably lower than such costs when examined collectively for all the member counties. The reduction costs will tend to increase purchasing capability for greater volumes of material.
- The film review and evaluation process can now be expanded by another order of magnitude. The data bank by now will already contain information about all the new films. As each district or county preview committee evaluates the film, all such review data will be entered into the system via the terminal, to be compiled with previous data (possibly from other regions, also) for statistical tabulation. Again, the exact nature of the information to be input to the data bank as a result of the review findings will be determined during this phase in conjunction with the appropriate authorities in this area. Coupling this information with actual film utilization data, district or counties can now reduce much of the duplication of effort that goes into the selection of the most appropriate films to augment their own presentation to the class.
- The present spectrum of the available films to a given school is a function of the "richness" in

inventory of the center which services the given school. This "richness" factor is in turn variable from county to county. Under the new centralized system, all schools will be equally "rich" in terms of available material to them.

This study does not intend to establish the basis of how the operating costs of such a regional center will be shared. The appropriate basis to be used will be established by one of the supporting studies conducted during one of the earlier phases, most likely Phase I.

Phase IV

Phase IV (Figure 19) is the final phase in the development of the project and will tie the entire state into a single system. During this phase, the rest of the regional centers will be established. Predictably, the state-wide network of ETV stations[3] will have been established, as well as the majority of the schools having been equipped with classroom TV monitors.

Each of the new regions will have the same basic data bank, plus an additional portion of the data bank devoted to material unique to the given region. For example, the region servicing the inland cities, which are

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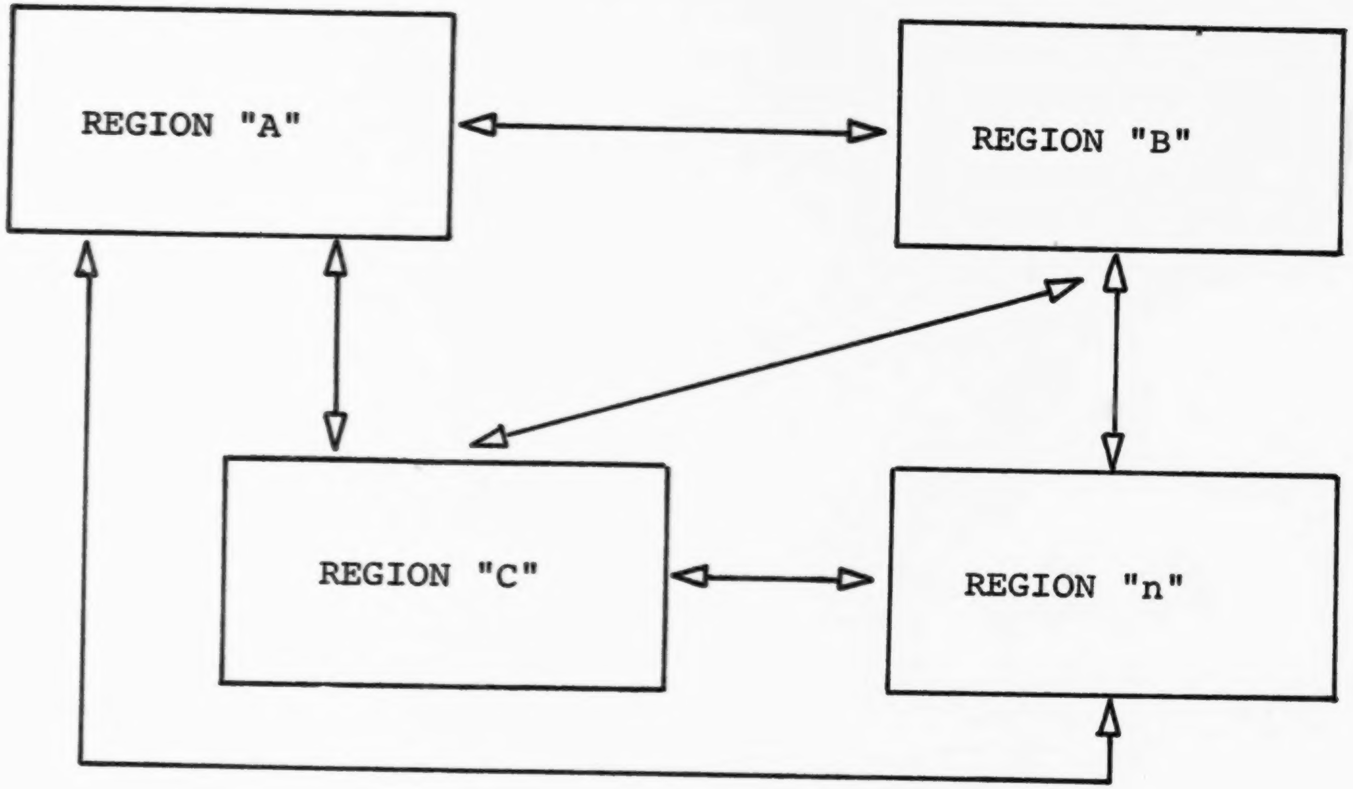
[3] *Educational Television for California*, California Television Advisory Committee (Sacramento, California, 1966).


REGION "A"
REGION "B"
REGION "C"
REGION "n"

PHASE IV

- All the Regional AV Centers interconnected into a state-wide system

FIGURE 19

more agriculturally oriented, may well contain in its data bank media titles dealing with various agricultural topics. Similarly, the region serving the Northern California schools may contain films covering the subject of forestry.

One of the new capability extensions introduced during this phase will be the ability of one region to communicate with another region via terminals. Through this capability, it will be possible to exchange information on film utilization between regions. An educator in one region can have, should he desire, access to the material not available in his own region, but handled by another region, as part of their specialized inventory. It will be possible to obtain this film from the other region by relaying the video image from the source region to the requesting region center, and from there to the destination school.

Finally, it is certainly not unreasonable at this stage of the system implementation to commence considering further expansion through interconnection with other similar state-wide regional systems. An integrated nation-wide media system would eventually involve and possibly culminate in a world-wide satellite exchange facility for educational media.[4]

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[4] Public Policy Issues - Reply, Comments of the Ford Foundation Before the Federal Communications Commission (In the matter of the establishment of domestic communication; satellite facilities by non-government entities), (Washington, D. C.: December 12, 1966), I, No. 16495.

Summary

An ultimate responsibility in any instructional media service center is the effective and efficient distribution of media that will allow for pertinent teacher-student interaction. The resultant is the learning experiences and gains derived from the discriminating use of media. Justification for the existence of media in the educational structure is manifested through its contributions to positive learning.

Should the reader accept the tenet, as stated above, it will follow that the proposed system will make a contribution to the solution of the problem as posed by Hoban,[5]

> The problems of new media in education, as with almost all the problems of new technologies, are not those of the mechanics or the machinery involved. The engineers and the technicians do a reasonably good job with the mechanics and the machinery of technology. The real difficulty is much more complex. It arises from the reorganization of procedures, the introduction and wider use of management on a higher level of skill, the changing role of the men and women in the process or the system, and the elevation of goals made possible by the productivity of technology.

Brown and Norberg[6] (Preface page vii) continue with an analysis by stating the problem is not one of adding more personnel, more films, more books, or more projectors. It is much broader. "We need," they state, "An insightful recognition of the proper role of media in the total process of education." To assume this role will require some changes in the management and utilization of resources.

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[5] Charles F. Hoban, "The New Media and the School," *Audio-Visual Communication Review*, X, No. 6 (November and December, 1962).

[6] James W. Brown, and Kenneth Norberg, *Administering Educational Media*, (New York: McGraw-Hill Book Company, 1965).

It is to innovative change in management that this system addresses itself. The complexity of implementing a system of this magnitude requires a phased, systematic development which incorporates continual experimentation, study, and modification.

Phase I is crucial to the development because all the major system elements will be introduced, including the selection of pilot schools, media center, transmission system, and data processing center. Hardware and software requirements will be defined and acquired. A composite system will be established in miniature and semi-automated procedures will be tested. Phase I will provide concurrent experimental designs which will test and provide for system improvements. Phase II will provide for an expansion of the system to a county-wide integrated media distribution utilization paradigm. Phase III expands this facility, interconnecting several media centers regionally. The final phase (Phase IV) interconnects the entire state. Software requirements will be totally defined and developed to satisfy regional specifications (see following summary charts).

Phase IV presupposes a state telecommunications system which will facilitate the implementation of this final phase. Implications of the state-wide network will be accompanied by a complex of social, political, and legal implications which will be discussed in the final chapter.

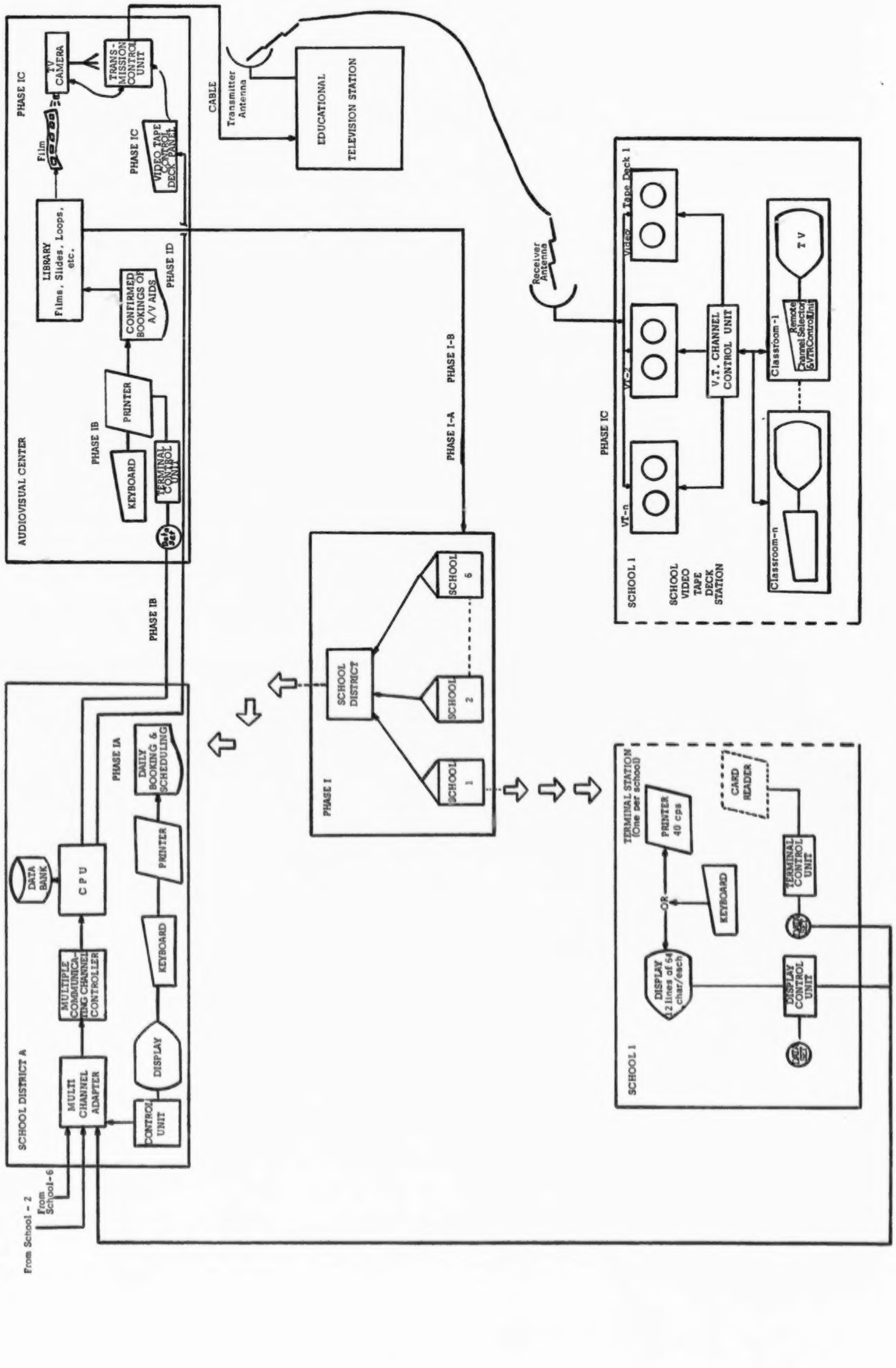
SCHOOL DISTRICT A
MULTI CHANNEL ADAPTER
MULTIPLE COMMUNICATING CHANNEL CONTROLLER
DATA BANK
C P U
CONTROL UNIT
DISPLAY
KEYBOARD
PRINTER
DAILY BOOKING & SCHEDULING
PHASE IA
PHASE IB
From School - 2
From School-6
AUDIOVISUAL CENTER
PHASE IB
KEYBOARD
PRINTER
TERMINAL CONTROL UNIT
CONFIRMED BOOKINGS OF A/V AIDS
PHASE ID
LIBRARY Films, Slides, Loops, etc.
Film
TV CAMERA
PHASE IC
VIDEO TAPE CONTROL DECK UNIT
PHASE IC
TRANS-MISSION CONTROL UNIT
CABLE
Transmitter Antenna
EDUCATIONAL TELEVISION STATION
PHASE I-A
PHASE I-B
PHASE I
SCHOOL DISTRICT
SCHOOL 1
SCHOOL 2
SCHOOL 6
Receiver Antenna
PHASE IC
SCHOOL 1
SCHOOL VIDEO TAPE DECK STATION
VT-n
VT-2
Video Tape Deck 1
V.T. CHANNEL CONTROL UNIT
Classroom-n
Classroom-1
Remote Channel Selector &VTR Control Unit
T V
SCHOOL 1
TERMINAL STATION (One per school)
DISPLAY 12 lines of 54 char/each
OR
PRINTER 40 cps
KEYBOARD
CARD READER
DISPLAY CONTROL UNIT
TERMINAL CONTROL UNIT

FIGURE 20

AUTOMATED SYSTEM: SCHEMATIC OF THE ELECTRONIC COMPONENTS

BROAD HARDWARE AND SOFTWARE REQUIREMENTS SUMMARY FOR THE PROPOSED SYSTEM

Phase	Hardware Requirements	Software Requirements
I-A	At each pilot school: . A Data Station terminal consisting of: .. Display Unit .. Typewriter Printer .. Keyboard .. Card Reader .. Data Sets and Control Units At Computer Center: . A Data Station terminal as above . Multiple Channel Communications Control Unit	Software capability to provide: . Data Bank Update and Maintenance . Syntax for communicating between terminals and Central Computer . Booking algorithms . Scheduling algorithms . Statistical analysis of utilization data . Other requirements to render Sub-phase I-A operational
I-B	At Audiovisual Center: . A Data Station terminal as described under Sub-phase I-A	Extend the existing software capability to provide the following additional major features: . The use of the AV Center Terminal as a data input device . Ability to trap certain data during communication between schools and AV Centers

FIGURE 21-a

Phase	Hardware Requirements	Software Requirements
I-B (continued)		. Expanded Data Bank containing Film Review Board evaluation data and bio-data on newly released films
I-C	At each pilot school: . Video Tape Recorder . Video Tape . Remote VTR selector and Control Unit (at each classroom) At AV Center: . TV transmission cameras . Remote school and VTR selection control unit (manual control) . Transmission Control Unit At participating TV Station: . Appropriate re-transmission hardware (if not already available)	Extend the existing software capabilities to provide the following additional major features: . The use of the computer to control all the bookkeeping functions associated with the Film Media . Ability to provide the schools with a listing of the transmitted film media and the requesting teacher to whom it shall be forwarded . Ability of the schools to transmit special requests for non-stocked film media

FIGURE 21-b

Phase	Hardware Requirements	Software Requirements
I-D	At Computer Center: . Appropriate communications interface hardware to allow computer control of: .. Media Selection (dial-up type) .. School and VTR selection At AV Center: . A dial-up media retrieval installation . Computer controlled school and VTR selection control unit	Extend the existing software capabilities to provide the following additional major features: . The expansion of the data base to include data on all new film media . Ability of the computer to control the dial-up media retrieval system . Ability of the computer to control the school/VTR selection control hardware
II	At each participating school: . A Data Station terminal as described under Sub-phase I-A . A VTR station as described under Sub-phase I-C . VTR capability modified for color At County Computer Center: . Similar computer hardware as during Phase I, except that the Central Computer will be dedicated specifically to the Film Media operation	Extend the existing software capability to provide the following additional major features: . The inclusion into the Data Base complete Film Board Review information and analysis . The expansion of the syntax to allow the use of terminals for Board Review activity . The expansion of the communication module to allow processing of inquiries and bookings from all the participating schools

FIGURE 21-c

Phase	Hardware Requirements	Software Requirements
II (continued)	At AV Center: . Similar facilities as during Phase I except that the film retrieval capability will be expanded to handle larger volumes . Expanded transmission capacity	
III	At each participating school: . (See Phase II) At Regional Computer Center: . (See Phase II) (It is possible that a larger capacity computer may have to be installed at this time.) At AV Center: . (See Phase II)	Extend the existing software capabilities to provide the services described under Phases I and II in a manner adequate to handle the expanded volume, both in the Film Media titles and the number of participating schools.
IV	At Regional Computer Centers: . Additional computer communications gear to allow regional intercommunications capability.	Extend the existing software to allow inter-regional communication capability.

FIGURE 21-d

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

> There is a pressing need for more rational decision-making in education, as well as in other areas of public life. By rational, I refer to logical analysis that is applied to the systematic implementation of efficiency and effectiveness rather than intuition and experience alone.[1]

Summary of Problems

As was discussed, a paucity of research exists which relates to a solution of the logistic's relevant to motion picture utilization. In discussions about procedures with administrative staffs of instructional materials centers in California, it was found that tradition was the determiner of an effective service. When queried about procedures for ordering, booking, and cataloging, the directors indicated that "this was what our teachers wanted," or "it seems to work very well for us." When further investigation persisted on the meaning of these responses, the director assumed the teacher wanted it "this way" because he received little or no feedback to the contrary.

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[1] John F. O'Toole, "Systems Analysis and Decision-Making in Education," Second Annual Dr. Emery Stoops Lecture Paper Presented to Alpha Epsilon Chapter, Phi Delta Kappa, University of Southern California (Los Angeles, California: May, 1965).

The major purpose of this study, therefore, is to provide a systematic analysis of the current procedures used in ordering, booking, cataloging, distributing, and utilizing films, and introduce requirements for modern information processing techniques into these procedures.

Two problems were confronted: (1) to develop a statement of requirements for the integration of these functions into one system, and (2) to offer recommendations for making that system operational.

This study revolves about the need for introducing an efficient and meaningful division of labor between man and machines, but always subject to the rational control of the individual. A thoroughgoing analysis to the developments of an instructional media service would change the service and the curriculum itself. The need, therefore, was to consider the characteristic of the film-media.[2] It is appropriate to direct attention to the design of a process-control system as a unit.[3] This design would be expressed as a series of resistances and capacities. The description proposed in Chapter V clearly delineates control factors necessary for efficient operation. The design specifications also recognize the ultimate requirement of increasing capacity to satisfy the variety of commands made for instructions.

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[2] A. W. Vandermeer, "Systems Analysis and Media - A Perspective," *Audio-Visual Communication Review*, XII, No. 3, (Fall, 1964).

[3] H. C. Buley, "Multimedia Systems of Instruction," *Audiovisual Instruction*, X, No. 5 (May, 1965), 391-2.

Major problem areas, therefore, were defined in the context of optimum effective utilization of educational films. The current procedures for acquisition and use of films indicate barriers which suppress desirable instructional procedures. A recent study by Eleanor Godfrey (Appendix El) indicates the problems of hardware, software, cost, and physical conditions still persist. Since the hardware systems for projection have not changed since their invention, with the exception of design, it seems feasible that a total system modification and restructure is necessary. The complexity of redesign increases the variables[4] with which a media administrator must work. Variables which seem most appropo to this paper include: value reorientation and restructuring. Each of these variables center upon the social and financial orientation of the system. Juxtaposed to the restructuring in a media center, which assuredly will create problems, is the alleviation of the non-teaching trivia with which a teacher must cope in using films. Obviously, the test for the traditional "audiovisual" specialist will be in whether he is concerned with media instrumentation as exists, or whether he will give his loyalty to communication and learning.[5]

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[4] Wesley C. Meierhenry, "Innovation, Education, and Media," *Audio Visual Communication Review*, XIV, No. 4 (Winter, 1966).

Additionally, the current practice of processing films introduces a considerable time lag between planning, production, and its use by the teacher. Added to the complexity of acquisition in a media center is the problem of locating, ordering, and using the film. The conventional system is its own barrier,[6] containing a multitude of detailed paperwork and time-consuming procedures which tend to destroy enthusiasm for using the resources. Media specialists have attempted to increase the probability for providing more efficient service. One method is to increase print inventories. Teachers would have a better opportunity to get a required film; yet this creates another paradox. As was demonstrated, multiple-print inventories increase, which subsequently limits the potential for a media center to provide variety. The effects tend to create a stagnating library with too few opportunities for renewal. Budgets are limited, creating a dilemma of purchasing decisions; consequently the service becomes less than adequate.

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[5] Eboch, *op. cit.*, p. 151.

[6] James W. Brown, and James W. Thornton, Jr., "New Media in Higher Education and Division of Audiovisual Instructional Services" (Washington, D. C.: National Education Association, 1963), 173.

Objectives of the proposed system, which will hopefully provide a relief from the barriers, are defined in Chapter I. A computer-controlled system will carry with it new possibilities for instructional film use not possible under the present manual system. It was necessary to study and prepare a system description of selected conventional media centers prior to the design and specification of requirements for a model automated system. This procedure allowed for a way of thinking[7] about the processes as it relates to teaching and learning.[8] Springer[9] and Knirk[10] claim economy as an approach to produce a system capable of achieving a given set of objectives. The proposed paradigm provides a built-in propensity for heuristic development[11] based upon the critical needs of the teacher[12] which ultimately becomes a subsystem within the major component in individualized instruction.[13]

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[7] C. Walter Stone, "Some New Frontiers for Newer Media," *Audio Visual Communication Review*, IX, No. 4 (July-August, 1961).

[8] John Gilpin, "Design and Evaluation of Instruction Systems," *Audio Visual Communication Review*, X, No. 2 (March-April, 1962).

[9] C. H. Springer, "Techniques and Costs II, The Systems Approach," *Saturday Review* (January 14, 1967), 56-7.

[10] Frederick G. Knirk, "An Analysis of Certain Time and Cost Measures Involved in the Use of Instructional Technology Systems," *Dissertation Abstracts*, XXVI, No. 9 (March, 1966).

[11] Elwood E. Miller, "A Descriptive Study, Evaluation and Analysis of Instructional Systems Development Activities in Selected Departments at Michigan State University from 1960-1963," *Dissertation Abstracts*, XXVI, No. 8 (February, 1966).

Recommendations

In his report to the California Public Schools Instructional Television Advisory Committee (PSITV), Dr. Henry McCarty stated,[14]

> The revolution in communications which is occurring today gives us the power to transform our entire social body. Whether we will use this growing power for constructive purposes depends upon the decisions we will be called upon to make now and in the near future. But whatever we do, the electronic communications systems that have been developed together with computer control, to transmit only the vital messages constitutes a technology of unbelievable speed, power, and scope that is here to stay.
>
> Using electronic means of originating, transmitting, receiving, and displaying information, the videotape recorder as a massive storage system and the computer as a system of control, enables us to create one telecommunications system embracing all media, for the revolution truly does embrace all media -- broadcasting and press, publishing and recording, speech and graphic. Our ability to transmit all information in one compatible electronic system will eliminate the distinctions that have separated the media in the past. Since television signals and computer signals are the same, they

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[12] George L. Conti, "The Administration of the Audio-Visual Programs in the Cleveland Public Schools," *Dissertation Abstracts*, XXV, No. 11 (May, 1965).

[13] Patrick Suppes, "The Computer and Excellence," *Saturday Review* (January 14, 1967).

[14] Henry R. McCarty, *Educational Telecommunications: The Media System of the Future*, Report to the Public Schools Instructional Television Committee, Fresno, California (April 24, 1968).

> can be combined into a new system in which the potential is far greater than the sum of the parts.
>
> The beauty of the electronic communications system is that the "laws of nature" make it possible to convert all types of communications into this one telecommunication system, to store the information on videotape and to search, retrieve, transmit, and display, through the control of computers. The question now is, "What are educators going to do to start building this system?"

Further, assumptions arising from the discussions of a telecommunications system require pervasive considerations for the needs of its users.[15] This emphasis upon the user reflects the increased attention to learning instead of teaching.[16]

A paradigm for a communications network as proposed will necessarily require computer control systems. Increased microstorage developments[17] and miniature circuitry[18] will contribute toward greater information storage capacities, changes in machine logic and greater reliability.[19,20] Hopefully, the resultant of new developments in communications and computer technologies will allow for lower cost transmission systems.[21]

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[15] James W. Brown, and Ruth H. Aubrey, "New Media and Changing Educational Patterns," *A Summary of the Presentation and Reports of the New Media Workshop* (Sacramento, California: State Department of Education, 1965).

[16] Harold E. Wigren, *What's Here in Educational Technology*, Speech at the Association for Supervision and Curriculum Development, National Education Association, Chicago (January, 1968), 20.

[17] Ronald J. Gentile, "The First Generation of Computer-Assisted Instructional Systems: An Evaluative Review," *Audio Visual Communication Review*, XV, No. 1 (Spring, 1967).

[18] Jan A. Rajchman, "The Shrinking Computer," *New York Times*, Section 11 (May 23, 1965), 15.

Assuming feasibility of the intermediate step to an ultimate telecommunications system, this proposal requires four major phases for implementation. Recognizing the concurrent need for study and inventory of existing facilities to arrive at a procedure for implementation, the writer incorporates the recommendations of the PSITV for a five phase approach which leads to the operational telecommunications system.[22]

> Phase Number 1 - A presentation to the State Superintendent of Public Instruction of the need for educational telecommunications development and to obtain approval for the development of future phases listed.

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[19] Donald L. Rohrbacher, "Future Hardware for Electronic Information Handling Systems," *Electronic Information Handling* (Washington, D. C.: Kent and Taulbee, Spartan Books, Inc., 1965), 293.

[20] Harold Borko (ed.), "A Look Into the Future," *Computer Applications in the Behavioral Sciences* (New Jersey: Prentice-Hall, 1962), 597-601.

[21] R. W. Marker, and Peter P. McGraw, "Gaps in Educational Information Systems," *The Computer in American Education*, Edited by Donald Bushnell and Dwight W. Allen (New York: John Wiley and Sons, Inc., 1967), 199.

[22] McCarty, *loc. cit.*

Phase Number 2 - A state-wide inventory of present equipment and facilities that may become component parts of a telecommunications system (study).

Phase Number 3 - The development of descriptive information on telecommunications systems with a publication describing levels of telecommunications systems, specifications, and engineering information on the various levels of system (study and publication).

Phase Number 4 - The establishment of consultants and engineers in the State Department of Education (SDE) to coordinate and cooperate with local school districts in the development of educational telecommunications systems.

Phase Number 5 - The submission of a plan to the State Legislature to establish an agency, or agencies, to coordinate the cooperation and interconnection of local telecommunications systems into a state-wide telecommunications service.

It will be recognized that studies will be performed regarding the many technical, legal, and political implications embodied in the above. Concurrently, however, the proposed system is feasible with existing hardware and software. It is recommended, therefore, that the implementation of the system proceed, concurrently with the phased study recommended by the PSITV.

Recommendation Number 1

A study be funded to establish and define specific engineering requirements to implement phase one of the proposed system described in Chapter V. The study will include identifying:

- Hardware needs and installation requirements.
- Pilot schools and media center.
- Computer software requirements.
- Procedures for using motion pictures through the communications system.
- Need for mutual working relationships with the National Information Center for Educational Media (NICEM) for use of the data bank and other facilities for hardware/software needs.
- Requirements for financial support.
- Needs for dissemination of information within the pilot program as well as keeping others informed of progress.
- Methods for maintaining records for film producers, school administrators, and teachers to assess levels of utilization.
- Procedures for using educational films within the legal educational framework.

Support must include concurrent efforts of the PSITV to study the entire telecommunications system which will provide the project director answers to some of the questions related to the implementation of the proposed system.

Recommendation Number 2

The orderly process of implementing the system will continue for several years. Predictably, a four to five year plan should be recognized as adequate to complete the four phase system. Within this span of time, a telecommunications network should be started if not already completed, also legal and financial considerations concluded.

It is recommended that sufficient financial aid be approved through federal government appropriation, state assistance which currently exists for similar programs (be diverted), and local support which is used for hardware and software be diverted to the new effort.

A massive personal commitment to the concept and to the system is necessary to justify the initial cost of conversion. It may not be possible to implement a system of this nature without complete commitment to the concept. Trade-offs will provide financial justification for discontinuing present hardware in schools. Existing equipment is obsolete, ineffective, and inefficient necessitating a redeployment of duties and responsibilities of hardware, software, and people.[23]

Recommendation Number 3

Many problems will exist pertinent to the legal responsibilities inherent in local school government. Taxation for school support is a local effort, thereby a local control responsibility. Increasing sensitivity to centralization of functions in government also exists in the school society. Americans are preoccupied with a "nationalistic" surge regarding their schools. Because a regional or state telecommunications system respects no boundaries, it will be necessary to work toward a process of assimilation of functions relative to boundaries greater than those existing in school districts.

Concurrent efforts by the educators will necessitate new legislation which establishes a coordinating agency, fiscal support, and provisions for the planning and development of a telecommunications system. Legislation will need to be amended to provide inter-agency cooperative implementation and integration such as the regional data processing centers, the educational television advisory commission, instructional media centers, and others.

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[23] William Brish, "Administrative Changes Dictated by Research in Newer Educational Media," *Newer Educational Media* (Pennsylvania State University, in Cooperation with USDHEW, 1961), 50.

Existing legislation restricts educational planners and stifles possible new developments. An example of the restrictive nature of legislation is the term "audiovisual." Since this term did not include television in its definition, a long legislative procedure was necessary to make television a legal instructional tool. These restrictions in an age of increasing technological development are unnecessary and tend to destroy efforts toward improving education.

Recommendation Number 4

In-service education[24] is a well-worn cliche in the educational heirarchy. Problems related to adequate training in the design and use of media may be due to the frustrations teachers acquire in their attempt to use these resources. The barriers (as discussed) continue to be insurmountable.

Training may be necessary in the utilization of component parts for specific instructional objectives rather than in utilization of the entire film. However, this writer recognizes that faulty utilization may not be in the teacher's inability to use media but the anachronistic hardware configurations with which he must do battle.

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[24] Brown and Aubrey, *op. cit.*, 83.

A program of training and retraining will be necessary prior to and during implementation of this system, not for the teacher, but for the great number of media specialists. These specialists must convert themselves from mechanical-clerical handlers of media to instructional technologists. What is needed with the new system will be instructional planners who will assist the teacher in devising logistics of instruction based on specified objectives. This training will give the media specialist the facility to do what he says he has been unable to do because of lack of time. Finally, professional responsibilities will be his; the work of running the center is the machine's responsibility.

Recommendation Number 5

A concurrent "re-education" program will be necessary for educational film producers and suppliers. Continued efforts for planning and producing media will not be stifled. The vast expenses (Figure 22) for maintaining duplicate prints, preview, and evaluation programs will be diverted toward the more satisfying task of creating a greater variety of media to feed the system. Thus, compensation will be based on use, not on sale of prints.[25]

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[25] Brown and Aubrey, "Instructional Films and Instructional Television," *Educational/Instructional Broadcasting*, I, No. 1 (February-March, 1968), 38-43.

Film Company	Number of Films	Copies for Preview	Cost of Preview Inventory	Budget for Preview
1	108	1,620	$ 65,000.00	$ 71,000
2	19	570	---	---
3	105	3,500	$140,000.00	$200,000
4	310	15,500	$100,000.00	$150,000
5	40	300	$ 7,500.00	---
6	98	30	$100,000.00	$130,000
7	70	387	$ 13,655.00	$ 23,655
8	16	100	$ 5,000.00	---
9	17	289	$ 9,103.50	$ 13,500
10	230	20,000	$450,000.00	$850,000
11	260	6,500	$195,000.00	$250,000

A SELECTED LIST OF FILM COMPANIES
AND THEIR RESPECTIVE INVENTORY AND
COST FOR PREVIEW SERVICES

FIGURE 22

A concerted effort must be implemented to demonstrate and evaluate the full potential of this system with the creators of media. Cooperation from those whose livelihood is dependent on quantity will provide for diversion of their energies to quality.

Epilogue

General studies and several efforts have been made to increase the operational efficiency of media centers toward more effective learning. Federal funds have been expended to provide incentives for studies directing professional effort toward increased efficiency. This study, likewise, was supported by a grant from the National Defense Education Act (NDEA) Title VII research program. The question now is whether continued dissipation of federal funds is necessary or that the massive financial aid needed to implement the proposed program described herein will be forthcoming? It is difficult to reconcile a need to improve instruction without an accompanying redirection of financial aid. Funds continue to be allocated to alleviate local problems which are not too effectively solved. Regional approaches may provide the equality of access for the learner necessary in our present day technological society.

Implications

Prediction of human behavior is untenable, however, explorations approximating consequences of automation may suffice to explicate apposition in educational media.

Social Implications

Adequate explanation of cause-effect relationships exist in the industrial business complex when automation is introduced in the structure. Labor and management continue to explore alternatives to unemployable unskilled labor upon introduction of automation. In recognition of the challenge posed by the introduction of automation in education, a symposium was held to assess the impact of automation on the educational society.[26] The need for retraining programs is evident. Redeployment of personnel is a concomitant of retraining subsequently increasing employment possibilities.

Introducing automated procedures will tend to eliminate our "separate preoccupations with the problems which appear to be important from our separate standpoints."[27] Unsystematized inputs will generally overload existing structures, as is evident in media centers, which have already exceeded design capability. Anachronistic facilities tend to create dysfunction in the man-machine matrix.[28]

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[26] Luther H. Evans, and George E. Arnstein (ed.), "Automation and the Challenge to Education," Proceedings of Symposium Sponsored by the Project on the Educational Implications of Automation (Washington, D. C.: National Educational Association, 1962).

[27] James C. Thomson, Jr., "From Reason to Technology," *Educational Technology*, VIII, No. 6 (March 30, 1968), 3-9.

Mumford claims that the "last word in automation is automatic man." In proposing a system to eliminate the dysfunctional conventional man-machine interaction, the writer strengthens Mumford's plea that "our task today is to make the genuine goods derived from the automation of knowledge subservient to the superior history-laden functions and purposes of human culture."[29]

Additionally, the proposed system offers a solution to the "man-is-slave-to-the-machine" concept, because the machines are essentially withdrawn from the teacher's repertoire of resources leaving only the instructional sequences with which he must work. Although Heilbroner asks, "What does the machine 'do' to the man who attends it?" and "to the institutions of society which contain it?"[30] the writer feels Heilbroner establishes the justification for immediately implementing the proposed automated media system. Introducing new scientific and technological discoveries, "therefore will alleviate human and social problems rather than create them."[31]

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[28] Orrin E. Taulbee, "New Mathematics for a New Problem," *Electronic Information Handling* (Washington, D. C.: Kent and Taulbee, Spartan Books, Inc., 1965), 152.

[29] Lewis Mumford, "The Automation of Knowledge," *Audio Visual Communication Review*, XII, No. 3 (Fall, 1964), 29.

[30] R. L. Heilbroner, "The Impact of Technology: The Historic Debate," *Automation and Technological Change*, edited by John T. Dunlop (New Jersey: Prentice-Hall, 1962), 17.

Because the equal access to educational opportunities includes the use of materials, the proposed system will not recognize borders. Through rapid information processing techniques, every teacher and child will have access to all films.

Educational Implications

It seems appropriate to discuss the educational implications of the proposal by using Heinich's quotation from the writings of Marx and Ellul: "It is in error to view the new technological society within the dynamism of the old one."[32]

Equally important is the requirement that we do not assume new educational practice will fit the present educational structure. Examples of this dilemma exist in curriculum change. Individualized instruction cannot be effective in the lock-step classroom structure built earlier in this century; educational parks are only larger monuments to anachronism; dial access information retrieval systems are used to expand the availability for the most part of ineffective instruction; instructional television generally repeats the mediocrity of the classroom.[33]

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[31] Dubridge, "Education and Social Consequences," *Automation and Technological Change*, Edited by John T. Dunlop (New Jersey: Prentice-Hall, 1962), 26-7.

[32] Robert Heinich, "Instructional Technology and Instructional Management: A Proposal for a New Theoretical Structure," Unpublished doctoral dissertation (University of Southern California, 1967), 99.

Achievement of effective instruction must therefore occur at the curriculum planning phase. Heinich states,

> The recent shift from emphasis from classroom instruction to the curriculum planning function has been responsible for finally alerting instructional technology to the importance of the systems approach. It is also why audiovisual, as a designation of a group of media, is subsumed under instructional technology.[34]

Using the concept of instructional technology, it is now possible to establish a professional working relationship between the technologist and the teacher. The development of learning experiences at the curriculum planning phase allows sufficient time to determine alternatives among the three strategies Heinich established in the classroom. Through the use of automated procedures, the teacher may work with the (1) media and use media as an aid to his instructional sequence; (2) the teacher may select the media for an instructional sequence by introducing the mediated teacher and allowing the students to learn without the integral involvement of the classroom teacher during the presentation phase; and (3) the other alternative is to use the mediated teacher as an auto-instructional sequence allowing the mediated teacher the full responsibility of instruction.

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[33] Judith Murphy, and Ronald Gross, *Learning by Television* (New York: The Fund for the Advancement of Education, 1966).

[34] Robert Heinich, "The Systems Engineering of Education II: Application of Systems Thinking to Instruction," *Instructional Technology and Media Project* (Los Angeles: University of Southern California, 1965), 15-16.

The instructional technologist, through these three strategies, must work closely with the instructional planners for full development and implementation of the curriculum based upon specified objectives utilizing concordant mediated sequences.

Instructional technologists and teachers in planning curriculum experiences may specify the content and structure of mediated experiences. Planning of this nature may cause a change in the structure of films to the concept approach analogous to 8mm film loops. Annotations will be specific to the concept, thus retrieval will be easily programmed into the instructional sequence. Retrieval delays will be minimized or eliminated and long viewing periods will virtually be non-existant. The ultimate individualized retrieval system may be the home study center or in a school desk-top miniature control-viewing link to a central audio-video data bank. Individualized programmed instructional packages listing resources and codes will offer students a "personal" key to rapid random retrieval.

Legal Implications

A depth study of the legal implications necessary for implementing the proposed system must be made with individuals knowledgeable in communications and education laws. The purpose of this section, therefore, will be to provide some insight into the legal complexities accompanying the proposal.

A school system cannot be operated without using the results of someone's creativity.[35] Current laws relating to copyright and the proposed revisions which increase restrictions upon use of copyrighted works must be recognized. The proposed automated system will provide for periodic statistical reports on utilization of motion pictures thereby allowing for a payment (for use) procedure. Difficulty will be encountered, however, where films are sold by one organization but the creator of the films holds copyright. Solution to the copyright problem will come with amicable solutions to use of copyrighted materials. Both producer and educator must necessarily develop a plan which will benefit the economic incentive of the corporation and satisfy the instructional needs of students. In establishing a regional or state-wide telecommunications system, school personnel must revert to the education code of

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[35] Anderak, *et al.*, *op. cit.*

California.[36] Adequate provision for the development of regional services exist in the law. Specifically, Sections 262 and 263 establish authority with the Director of Education to "develop and involve means" for the use of "audio and visual" curriculum materials. The County Superintendent may, with his Board's approval, enter into agreements to distribute audiovisual materials[37] and establish means for maintenance and serving of these materials.[38] Legal provision for acceptance of funds for demonstration and experimentation[39] are incorporated.

Because the telecommunications process at this stage is most appropo, sufficient legislation exists regarding television instruction either by broadcast television or closed circuit facilities.[40] School districts and County Superintendents may also own or lease facilities[41] necessary for television signal transmission. Rules and regulations governing procedures for support and operation of systems are included in Sections 1520 and Sections 84-84.6 of the California Administrative Code.[42]

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[36] George H. Murphy (Compiled by), *Education Code 1965*, Department of General Services, Documents Section (Sacramento, California).

[37] *Ibid.*, Section 8853.

[38] *Ibid.*, Sections 811-816.

[39] *Ibid.*, Section 6065.

[40] *Ibid.*, Sections 6441-6444.

[41] *Ibid.*, Section 8851.

The establishment of regional data processing centers includes provisions for instructional uses of these centers.[43] Appropriations are made for data processing centers and instructional television, therefore allowing for partial funding.[44] Juxtaposed to the support of facilities for distributing motion pictures, are the implications of rediverting appropriations now established for television and audiovisual programs. If the function of media centers is provided through the established or newly created data processing centers, will it be feasible to share the appropriation established in the Education Code? Another question which arises is, whether a more propitious method of gaining local board approval and adoption of films would function within the law consistent with network distribution.[45]

Developments in regional cooperative services in television, data processing, curriculum development, and audiovisual services among counties and districts demonstrate the feasibility of expanding beyond local school borders to share expensive resources. It is unlikely that the proposed system is contrary to progression toward improved utilization of film media.

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[42] California State Department of Education, *California Administrative Code: Title 5, Education* (Sacramento, California: June, 1960).

[43] Murphy, *op. cit.*, Sections 9181-9188.

[44] Murphy, *op. cit.*, Section 18270.

[45] Murphy, *op. cit.*, Sections 8851-8856.

Teachers' Rights

Increasingly, teachers are employed to assist in the production of film media, especially telelessons. Considerable guidance has been provided through the National Education Association and the California Teachers Association in recognition of teaching talent. Initial arrangements for remuneration are made with producing agencies. Statistical data provided will establish a base for payment as proposed above (for producers).

> It would be most fortunate if a universal system could be developed which is profitable and fair to both the creators and users of school staff-made material.[46]

Cautions

Too often when new developments are introduced into the educational system, proponents become overly enthusiastic about having the ultimate answer to instructional problems. The enthusiasm generated often leads to claims that the new development introduced becomes a panacea for educators. The history and literature of education is profuse with claims for eliminating the problems of providing good instruction to students. A distribution system, such as proposed in this study, is not a panacea for educators' ills. However, if accepted in the context for which the system was defined, it possibly will provide a more reliable, efficient, and effective means for using existing materials.

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[46] Anderak, *et al.*, *op. cit.*, 108.

It has been suggested that the hardware systems are too cumbersome and inconvenient to use. Teachers are among the very few professionals who must be trained to manipulate huge and weighty equipment. This proposed system does not introduce a new technology into the classroom; rather, it proposes elimination of training to operate equipment - a non-academic function.

A drastic reorganization of the school system, funded well,[47] is not the imperative, but if human and dollar costs were considered, the transition to a new system would not be difficult. The computers employed to provide the distribution service are used as a management tool. Instructional control is maintained by the teacher not as indicated in Chapter IV, but by personnel in the media centers. "If significant progress is interpreted as widespread and meaningful adoption, integration, and use of devices"[48] within the classroom, a new management system for the use of media is necessary.

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[47] Anthony G. Oettinger, and Sema Marks, "Educational Technology: New Myths and Old Realities," *Harvard Educational Review*, 38, No. 4 (Fall, 1968), 697-717.

Oettinger and Marks discussed a number of problems with which education must deal when introducing the new technology:[49] (1) a need for retraining to forward the state of the art, (2) a claim for manpower reduction may be fallacious for the introduction of the new technology, (3) a lack of systematic values in attaining goals of education through technology, (4) a technology which contributes little freedom and choice of options so that people feel like unwilling victims, and (5) an institutional rigidity with a concurrent lack of technological knowledge.

Belanger[50] stated that educational problems may become distorted and cause technical means to become ends. To avoid this means-ends conflict, it will be necessary to use a behavioral approach to technology because a physical (mechanistic) approach is inconsistent with effective instruction.

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[48] Anthony G. Oettinger, "The New Myths of Educational Technology," *Saturday Review* (May 18, 1968), 76.

[49] Oettinger and Marks, *loc. cit.*

[50] Maurice Belanger, "Discussion, Educational Technology: New Myths and Old Realities," *Harvard Educational Review*, 38, No. 4 (Fall, 1968), 722.

During the study, the writer has been confronted with a consistent adverse reaction to the proposal for introducing data processing techniques into education. The discussion centered on the dehumanization of teachers and students with the introduction of computer hardware. No more dehumanization is evident in the teaching-learning process than when teachers must cope with the many problems of acquiring and using equipment and materials which are housed in central locations. These media centers often are located many miles away from the instructional setting. Additionally, the system proposed will necessitate a great amount of materials. These exist and need only a method of access for all teachers and all students. Therefore, the system does not introduce a new medium for instruction; rather, a new transmission system for the existing media.

Summary

Five recommendations for the implementation of the proposed system are provided:

- A study of specific engineering requirements for hardware and requirements for software with concurrent efforts to implement the system as described in Phase I.
- Concurrent studies will be necessary under the auspices of the Public Schools Instructional Television Advisory Committee.

- Sufficient funding be provided to implement the system in its orderly phased approach. Commitment to the concept must accompany allocations of funds.
- The study of legal provisions for implementing the system may reveal needs for a change in legislation. Efforts of appropriate personnel including engineers and attorneys will be needed to seek proper legislation for success.
- A program of training and retraining of educators and producers will be necessary. All persons involved in educational media planning, development, and use will be concerned about the proper integration of the system into their lives.

Social, legal, and educational implications were discussed. Major problems will confront educators within the legal framework of state legislation. Federal legislation was not detailed. However, spectrum space will be required and FCC policies, costs for microwave and/or cable systems will need definition.[51,52] The promise of making

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[51] Russell Paquette, "Software: The Art, The Science, The Industry," *S. D. C. Magazine*, XI, No. 3 (March, 1968), 1-15.

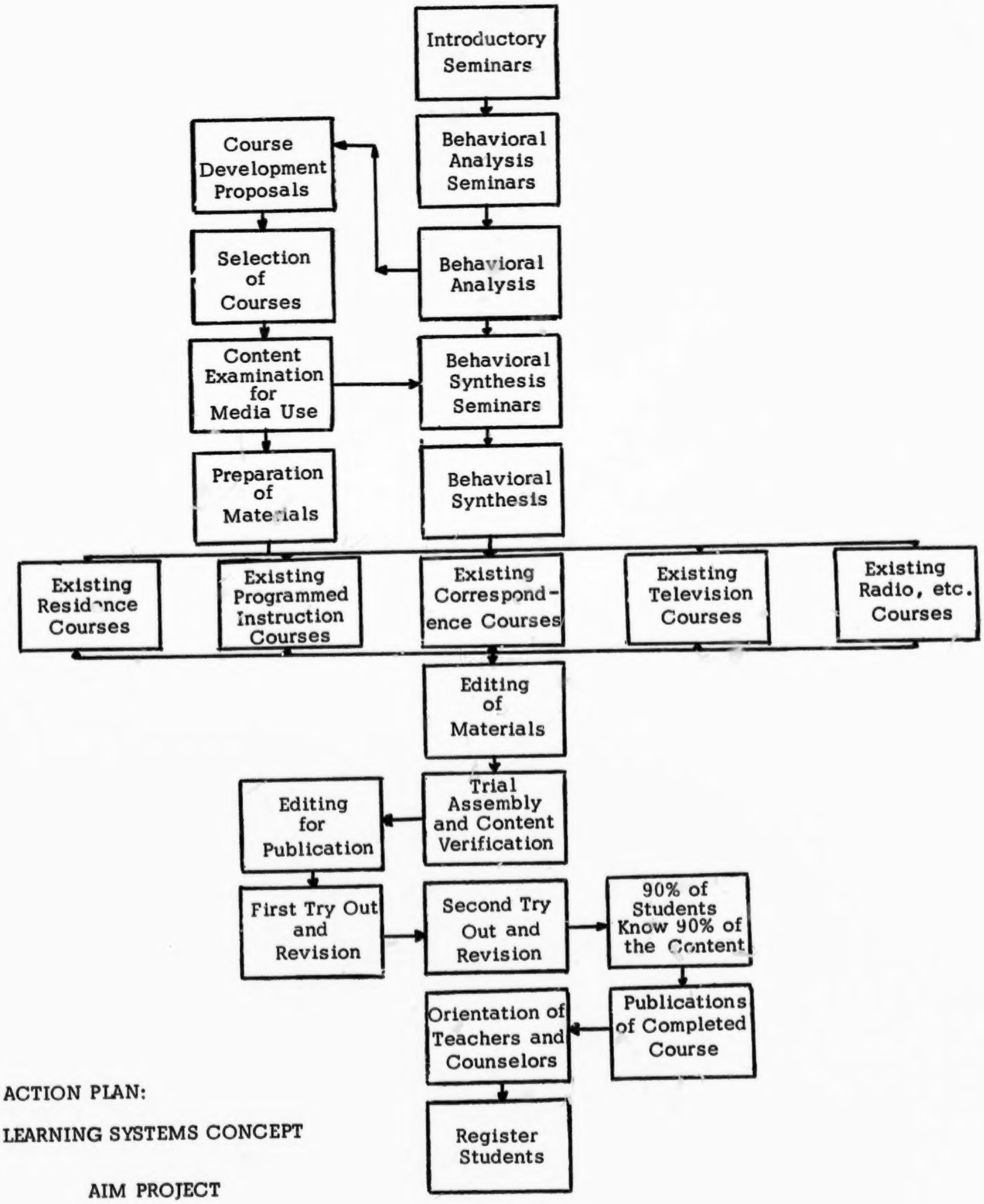
[52] Nicholas Johnson, "Crises in Communications," *Television Quarterly*, VI, No. 1 (Winter, 1967), 21-30.

instruction efficient and effective within the framework of the proposed system can only be achieved through re-evaluation and redirection of existing statutes.

APPENDIXES

APPENDIX A

FLOW DIAGRAMS FOR THE AUTOMATED INSTRUCTIONAL MEDIA PROJECT AND PROGRAMMED LOGIC FOR AUTOMATED TEACHING OPERATION

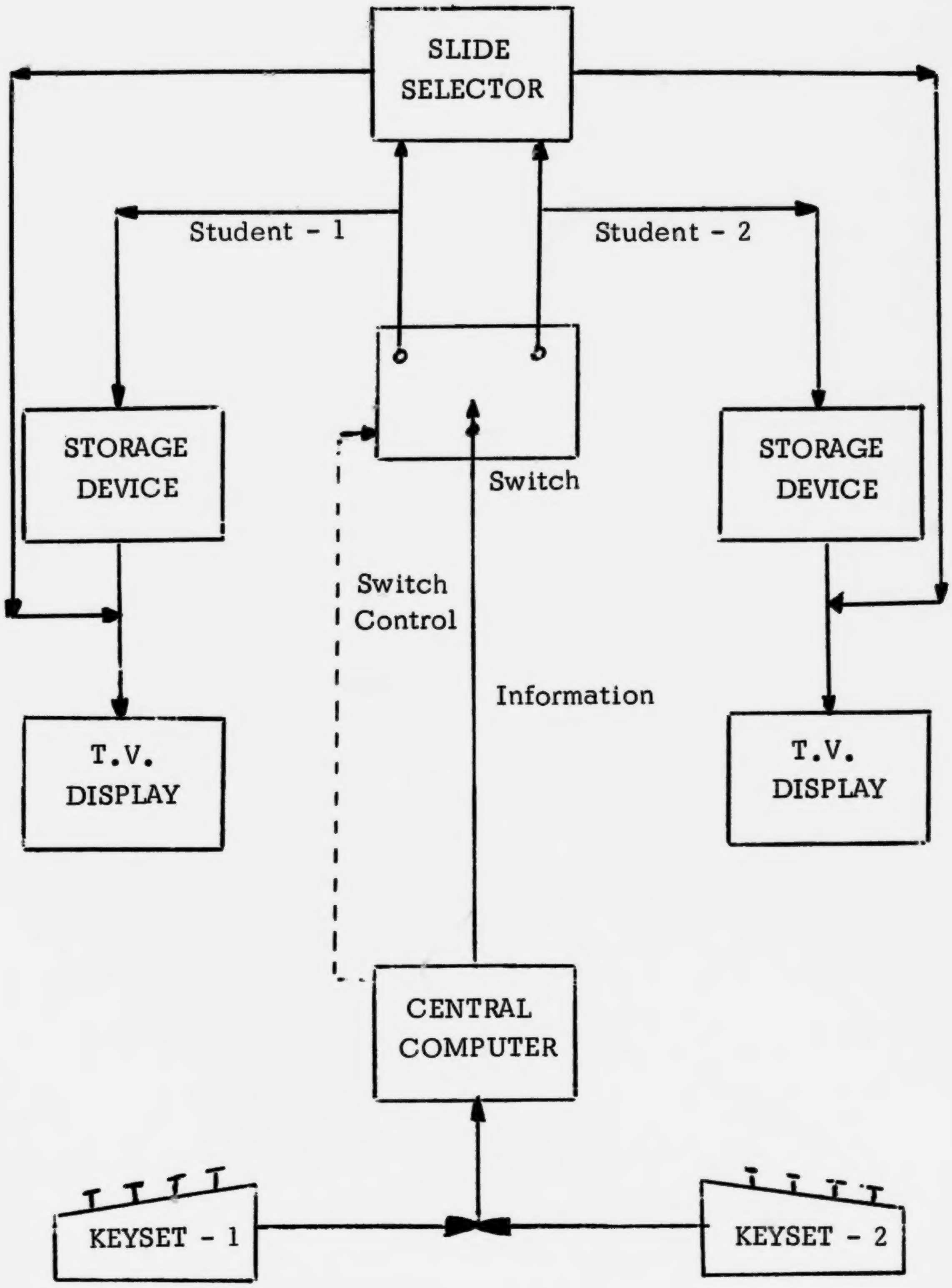

Introductory Seminars
Course Development Proposals
Behavioral Analysis Seminars
Selection of Courses
Behavioral Analysis
Content Examination for Media Use
Behavioral Synthesis Seminars
Preparation of Materials
Behavioral Synthesis
Existing Residence Courses
Existing Programmed Instruction Courses
Existing Correspondence Courses
Existing Television Courses
Existing Radio, etc. Courses
Editing of Materials
Editing for Publication
Trial Assembly and Content Verification
First Try Out and Revision
Second Try Out and Revision
90% of Students Know 90% of the Content
Orientation of Teachers and Counselors
Publications of Completed Course
Register Students

ACTION PLAN:

LEARNING SYSTEMS CONCEPT

AIM PROJECT

A 1

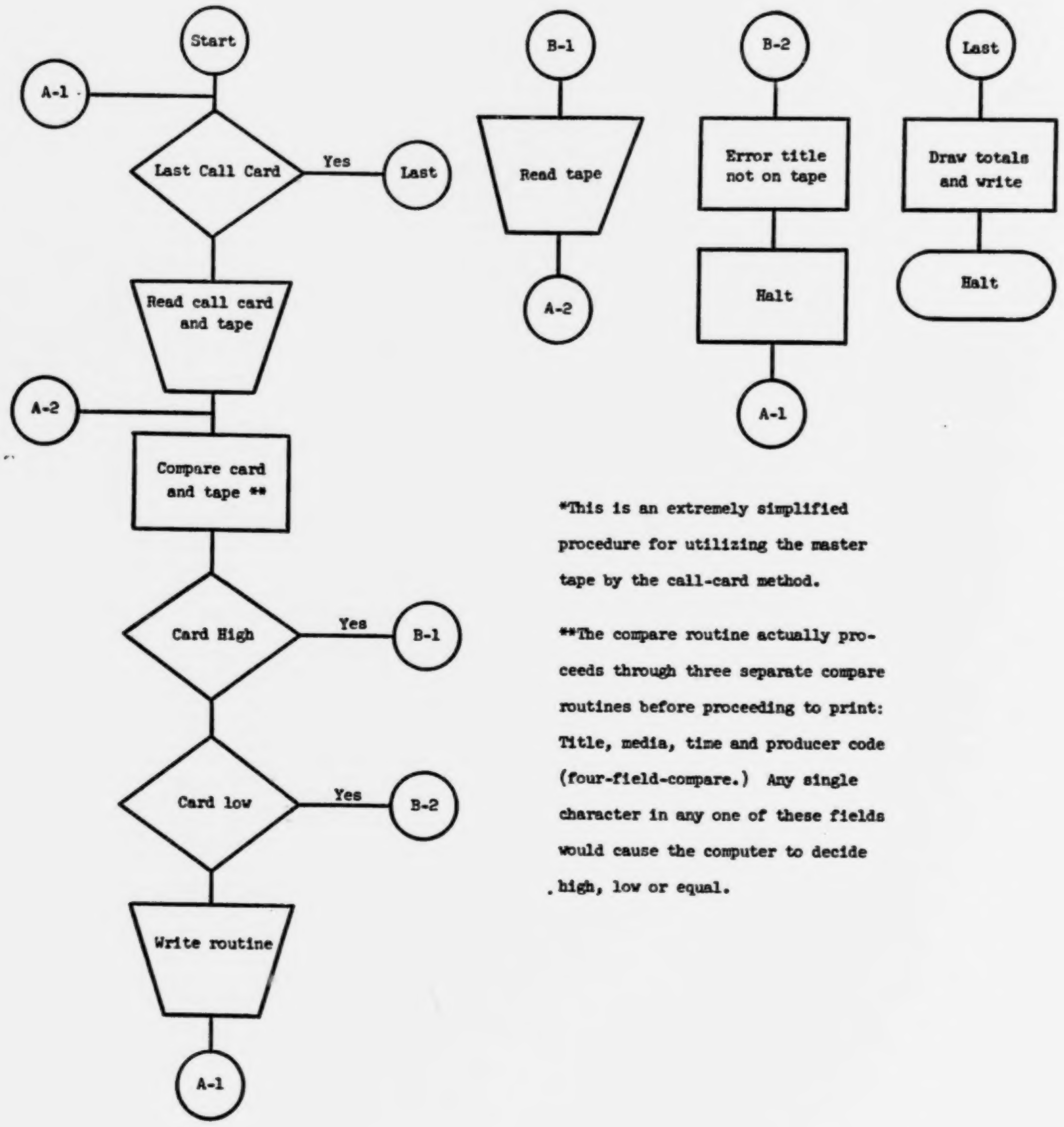

SLIDE SELECTOR
Student - 1
Student - 2
STORAGE DEVICE
Switch
STORAGE DEVICE
Switch Control
Information
T.V. DISPLAY
T.V. DISPLAY
CENTRAL COMPUTER
KEYSET - 1
KEYSET - 2

A 2

APPENDIX B

THE AUTOMATED CATALOGING PROJECT

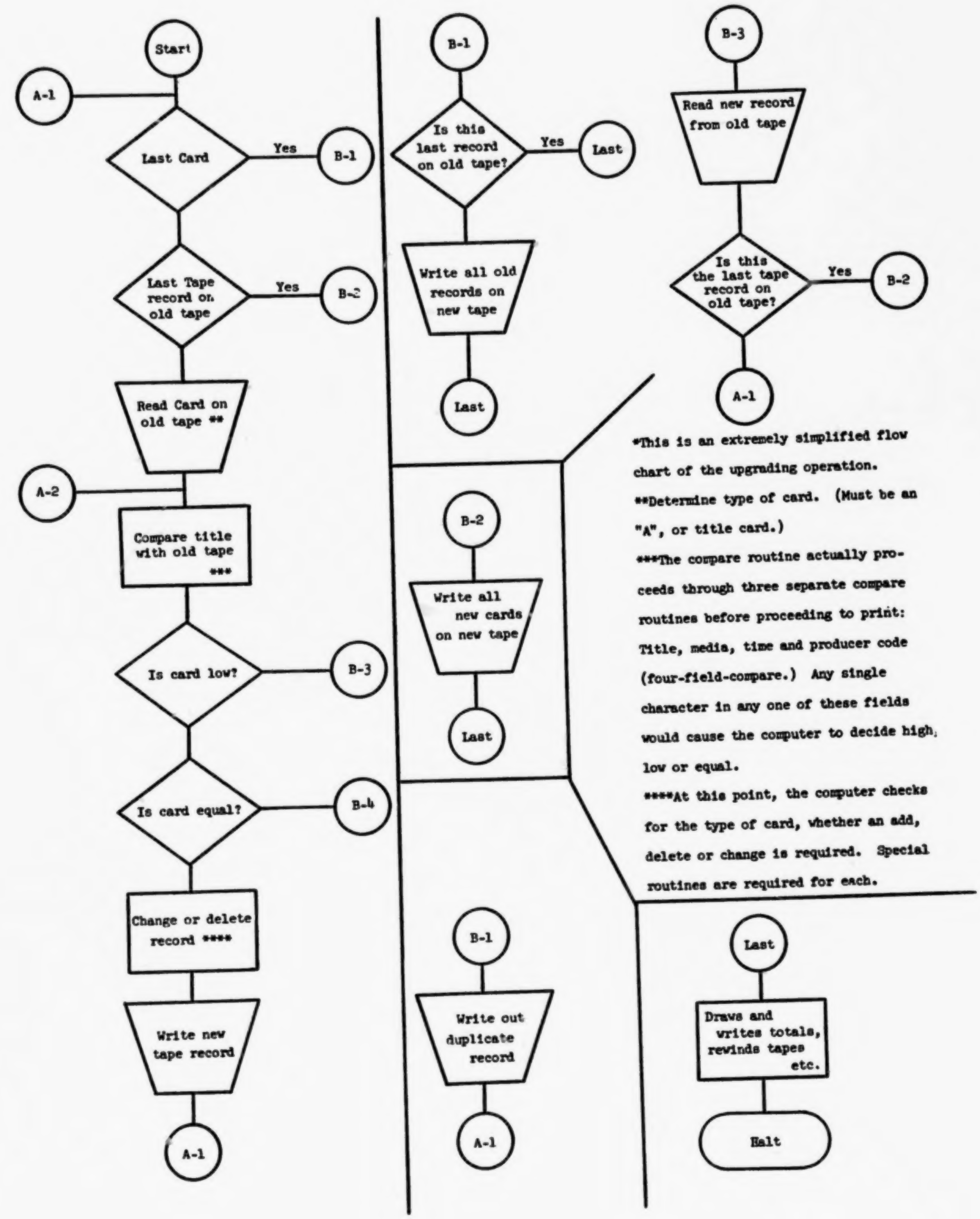
FLOW CHART OF PRINT PROCEDURE*


Start
A-1
Last Call Card
Yes
Last
Read call card and tape
A-2
Compare card and tape **
Card High
Yes
B-1
Card low
Yes
B-2
Write routine
A-1
B-1
Read tape
A-2
B-2
Error title not on tape
Halt
A-1
Last
Draw totals and write
Halt

*This is an extremely simplified procedure for utilizing the master tape by the call-card method.

**The compare routine actually proceeds through three separate compare routines before proceeding to print: Title, media, time and producer code (four-field-compare.) Any single character in any one of these fields would cause the computer to decide high, low or equal.

FLOW CHART FOR UPDATING MASTER FILE*


Start
A-1
Last Card
Yes
B-1
Last Tape record on old tape
Yes
B-2
Read Card on old tape **
A-2
Compare title with old tape ***
Is card low?
B-3
Is card equal?
B-4
Change or delete record ****
Write new tape record
A-1
B-1
Is this last record on old tape?
Yes
Last
Write all old records on new tape
Last
B-2
Write all new cards on new tape
Last
B-1
Write out duplicate record
A-1
B-3
Read new record from old tape
Is this the last tape record on old tape?
Yes
B-2
A-1
Last
Draws and writes totals, rewinds tapes etc.
Halt

*This is an extremely simplified flow chart of the upgrading operation.

**Determine type of card. (Must be an "A", or title card.)

***The compare routine actually proceeds through three separate compare routines before proceeding to print: Title, media, time and producer code (four-field-compare.) Any single character in any one of these fields would cause the computer to decide high, low or equal.

****At this point, the computer checks for the type of card, whether an add, delete or change is required. Special routines are required for each.

ALPHABETICAL LISTING

A

A TRAVERS PARIS 20 MIN
RENTAL 6.50

A FRENCH LANGUAGE FILM. A TOUR OF PARIS, DISCUSSING ITS SIGHTS AND HISTORY. SEVERAL OF THE PICTURED SIGHTS INCLUDE LA PLACE DE L'ETOILE, LE TOUR EIFFEL, LOUVRE, QUARTIER LATIN, SORBONNE UNIVERSITY AND THE CATHEDRAL OF NOTRE-DAME. CONCLUDES BY PICTURING THE 1944 PARIS LIBERATION CELEBRATIONS.
FROM THE ICI LA FRANCE SERIES.
EVERYDAY ASPECTS OF FRENCH CULTURAL LIFE
PROD-ATV DIST-MGHT 1964

ABACUS 11 MIN
COLOR RENTAL 6.00

SHOWS HOW TO USE THE OPEN-END ABACUS. DISCUSSES THE HISTORY OF THE DECIMAL NUMBER SYSTEM AND PRINCIPLES OF ITS USE, SUCH AS GROUPING IN ADDITION, REGROUPING IN SUBTRACTION AND COMPARISON OF NUMBER VALUES.
PROD-AVIS DIST-AVIS 1958

ABC OF G, THE 23 MIN
COLOR RENTAL 8.00

EXPLAINS THE EFFECT PRODUCED BY ACCELERATIVE FORCE UPON THE BLOOD. SHOWS TESTING EQUIPMENT USED TO DETERMINE HOW SOON THE SUBJECT GREYS, BLACKS AND REDS OUT. STRESSES KEEPING THE BODY IN GOOD PHYSICAL CONDITION.
PROD-USN DIST-DUART 1948

ABC OF PUPPET MAKING - TYPE ONE PUPPETS - THOSE EASIEST TO MAKE 10 MIN
COLOR RENTAL 6.00

REVISED EDITION OF ''ABC OF PUPPETS, TYPE 1.'' DEMONSTRATES PROCEDURES IN MAKING AND DRESSING A STRINGLESS HAND PUPPET. SHOWS HOW MATERIALS, SUCH AS GLUE AND THREAD, MAY BE USED SIMPLY AND EFFECTIVELY. TECHNIQUES IN DRAWING THE FEATURES AND MAKING THE COSTUMES ARE ILLUSTRATED.
PROD-BAILEY DIST-BAILEY 1954

ABC OF PUPPET MAKING - TYPE TWO PUPPETS - THOSE WITH BUILT-UP FEATURES 10 MIN
COLOR RENTAL 6.00

REVISED EDITION OF ''ABC OF PUPPETS, TYPE 2.'' SHOWS HOW TO MAKE A PUPPET HEAD WITH BUILT-UP FEATURES THROUGH THE USE OF PICTURE WIRE AND PAPIER-MACHE, AND HOW TO HOLD AND MANIPULATE A PUPPET SKILLFULLY. EXPLAINS THE PRODUCTION OF A PUPPET PLAY.
PROD-BAILEY DIST-BAILEY 1954

ABOUT THE HUMAN BODY 15 MIN
COLOR RENTAL 7.00

A YOUNG BOY VISITING HIS DOCTOR IS TOLD ABOUT THE NERVOUS, RESPIRATORY, DIGESTIVE AND CIRCULATORY SYSTEMS OF HIS BODY. HE ALSO LEARNS THE FUNCTION OF BONES, LIGAMENTS AND MUSCLES. ANIMATION IS USED.
FROM THE HEATH SCIENCE FILMS SERIES.
PROD-CF DIST-CF

ABOVE THE TIMBERLINE - THE ALPINE TUNDRA ZONE 16 MIN
COLOR RENTAL 7.00

DESCRIBES THE CLIMATIC CONDITIONS OF THE ALPINE TUNDRA VEGETATION BELT AND EXAMINES THE HARDY PLANT AND ANIMAL LIFE THAT CAN SURVIVE THE RIGORS OF HIGH ALTITUDES AND EXTREME TEMPERATURES.
PROD-NFBC DIST-MGHT 1960

ACCORDING TO PLAN 9 MIN
RENTAL 4.00

INTRODUCES ENGINEERING DRAWING AND ATTEMPTS TO PROMOTE STUDENT INTEREST IN THE FIELD.
FROM THE ENGINEERING DRAWING SERIES.
PROD-MGHT DIST-MGHT 1947

ADAPTATIONS OF INSECTS 13 MIN
COLOR RENTAL 6.00

DISCUSSES ENVIRONMENTAL ADAPTATIONS OF ANIMALS AS EXHIBITED IN INSECTS. TYPES OF ADAPTATIONS EXPLAINED INCLUDE MIMICRY, AND STRUCTURAL, NUMERICAL AND SEASONAL ADAPTATION. USES CLOSE-UPS AND MACROPHOTOGRAPHY TO SHOW BODY PARTS OF INSECTS.
PROD-STANF DIST-STANF 1962

ADAPTING TO CHANGES IN NATURE 10 MIN
COLOR RENTAL 6.00

DEMONSTRATES SOME FAMILIAR, AS WELL AS SOME UNUSUAL, WAYS IN WHICH LIVING THINGS ADAPT TO ENVIRONMENTAL CHANGES IN ORDER TO SURVIVE.
PROD-JOU DIST-JOU

ADAPTIVE RADIATION - THE MOLLUSKS 18 MIN
COLOR RENTAL 7.00

LIVE PHOTOGRAPHY OF MANY SPECIES OF MOLLUSKS SHOWS THE WAYS IN WHICH MOLLUSKS ARE ADAPTED TO SPECIALIZED AND DIFFERENT WAYS OF LIFE.
FROM THE BIOLOGY SERIES. UNIT 3, ANIMAL LIFE
PROD-EBF DIST-EBF 1962

ADDING AND SUBTRACTING 11 MIN
COLOR RENTAL 6.00

PRESENTS SIMPLE NUMBER STORIES USING LEAVES, MARBLES, APPLES, COINS, TOY BOATS, WHITE MICE AND DUCKS. EMPHASIZES HOW THE NUMBERS CHANGE WITH THE ACTION OF THE STORY AND ILLUSTRATES THE CORRESPONDING ARITHMETIC PROBLEM IN ADDITION OR SUBTRACTION.
PROD-JHP DIST-JHP 1955

ADDING FRACTIONS 20 MIN
COLOR RENTAL 8.00

DEMONSTRATES THE CONCEPT OF COMBINING LIKE THINGS, AS RELATED TO THE ADDITION OF FRACTIONS. ILLUSTRATES SITUATIONS WHERE THE ADDITION OF FRACTIONS IS USED.
FROM THE BUILDING CONCEPTS IN MATHEMATICS SERIES.
PROD-COLBRN DIST-COLBRN 1962

ADDITION OF WHOLE NUMBERS 29 MIN
COLOR RENTAL 8.50

EXPLAINS WHY AN UNDERSTANDING OF THE CONCEPTS OF SET UNION, COUNTING, CARDINAL NUMBER, ORDERED PAIR AND DISJOINT SETS IS IMPORTANT IN LEARNING TO ADD.
FROM THE GREATER CLEVELAND MATHEMATICS SERIES. NO. 3
PROD-SRA DIST-SRA

ADELIE PENGUINS OF THE ANTARCTIC (REV ED) 23 MIN
COLOR RENTAL 8.00

RECORDS THE LIFE CYCLE OF THE ADELIE PENGUIN, INCLUDING COURTSHIP, NESTING BEHAVIOR AND THE REARING OF CHICKS. ALSO PICTURES THE BIRDS TOBOGGANING OVER ICE.
PROD-NYZS DIST-SF 1965

ADMINISTERING A TESTING PROGRAM - SIX STEPS IN THE RIGHT DIRECTION 13 MIN
RENTAL 5.00

DISCUSSES SIX TESTING POINTS - PLANNING THE PROGRAM, HANDLING THE MATERIALS, TRAINING EXAMINERS, PREPARING STUDENTS, ADMINISTERING THE TEST AND SCORING.
PROD-ETS DIST-ETS PRODN-ONFILM

ADMINISTERING THE KUHLMANN-ANDERSON TEST 17 MIN
RENTAL 5.50

DEMONSTRATES HOW TO ADMINISTER THE KUHLMAN-ANDERSON TEST ''B'' WITH A STANDARDIZED FRAMEWORK. THE EXAMINER PROVIDES DETAILED DIRECTIONS FOR THE TEST.
PROD-LACS DIST-BAILEY 1960

ADMIRAL BYRD 26 MIN
RENTAL 7.50

USES RARE ACTUALITY FOOTAGE TO PORTRAY THE PERSONAL LIFE AND HISTORY-MAKING DEEDS OF ADMIRAL BYRD.

SUBJECT MATTER LISTING

AGRICULTURE

- ATOMIC AGE FARMER, THE
- BIG HARVEST - THE STORY OF AGRICULTURE
- CONSERVATION OF NATURAL RESOURCES
- CARE OF PETS (2ND ED)
- CORN FARMER, THE (2ND ED)
- DAIRY - FARM TO DOOR
- EARTHWORMS
- EGGS
- EGGS TO CHICKENS
- FARM ANIMALS (2ND ED)
- FARMER OF AUSTRIA
- FARMER, THE
- FARMER, THE - FEAST OR FAMINE
- FRUITS OF PLANTS, THE
- HARVEST OF SHAME
- HARVESTERS, THE
- HERDS WEST
- IMPROVING STRAINS OF LIVESTOCK - APPLICATIONS OF GENETIC PRINCIPLES
- LAND, THE
- MAP OF CALIFORNIA - AGRICULTURAL USES OF LOWLANDS IN COASTAL VALLEYS
- MAP OF CALIFORNIA - HIGHLANDS AND THEIR USES
- MAP OF CALIFORNIA - THE CENTRAL VALLEY AND HOW MAN USES THE LAND FOR AGRICULTURE
- MAP OF CALIFORNIA - THE DESERT AND HOW MAN USES DESERT VALLEYS FOR AGRICULTURE
- MILLING MACHINE
- NEW WAYS IN FARMING
- POULTRY ON THE FARM (2ND ED)
- RADIATION - SILENT SERVANT OF MANKIND
- RICE
- RICE, AMERICA'S FOOD FOR THE WORLD
- SHEEP AND SHEPHERDS
- STORY OF CALIFORNIA AGRICULTURE, THE
- TRUCK FARM TO STORE
- VOCATIONS IN AGRICULTURE
- WHEAT - FROM FARM TO CONSUMER
- WHEAT COUNTRY
- WHEAT FARMER, THE (2ND ED)
- WHEAT RUST
- WHOLESALE PRODUCE MARKET, PT 1

ANTHROPOLOGY

ARCHAEOLOGY

- DANGEROUS RIVER
- JOURNEY INTO TIME, A

CULTURAL ANTHROPOLOGY

- ANCIENT NEW WORLD, THE
- BEAR AND THE HUNTER, THE
- ESKIMO FAMILY
- ESKIMO IN LIFE AND LEGEND - THE LIVING STONE
- ESKIMOS - FOOD AND CLOTHING
- ESKIMOS - SHELTER
- ESKIMOS - SURVIVAL
- FOUR FAMILIES, PT 1
- FOUR FAMILIES, PT 2
- GREAT AMERICAN FUNERAL, THE
- HAWAIIAN NATIVE LIFE
- INDIANS - BOYS AND GIRLS
- INDIANS - HOW THEY LIVED
- INDIANS - HUNTING
- INDIANS - STORIES AND LEGENDS
- LAND OF IMMIGRANTS
- LAPLANDERS
- MAN AND HIS CULTURE
- MARCO POLO'S TRAVELS
- MAYA OF ANCIENT AND MODERN YUCATAN
- NATIVES OF GUATEMALA
- NAVAJO CANYON COUNTRY
- PEOPLE OF THE CONGO, A - THE MANGBETU
- PRIMITIVE MAN IN OUR WORLD
- PROBLEMS OF THE MIDDLE EAST
- PYGMIES OF AFRICA
- QUETZALCOATL
- SHELTER (2ND ED)
- SO THAT MEN ARE FREE
- SPIRIT OF THE WHITE MOUNTAINS
- THREE APPRENTICES, THE
- THREE GRANDMOTHERS, THE
- WEAVERS OF THE WEST
- WHY DO WE STILL HAVE MOUNTAINS

ARTS - PERFORMING

DANCE

- BUILDING CHILDREN'S PERSONALITIES WITH CREATIVE DANCING
- DAINIC NATYA - DAILY DANCE
- HOW TO WALTZ
- MODERN DANCE - THE ABC OF COMPOSITION
- MODERN DANCE TECHNIQUE IN SEQUENTIAL FORM
- SMOKI SNAKE DANCE
- TRAIL RIDE
- WORLD OF DANCE, THE

DRAMA

- AGE OF SOPHOCLES, THE
- BEAUMARCHAIS ET SON SIECLE
  PICKWICK PAPERS
- CHARLES DICKENS CHRISTMAS, A - FROM THE
- CHAUCER'S ENGLAND - WITH A SPECIAL PRESENTATION OF THE PARDONER'S TALE
- HAMLET - THE AGE OF ELIZABETH
- HUMANITIES,THE, LESSON 2, THE THEATER - ONE OF THE HUMANITIES
- HUMANITIES, THE, LESSON 3, OUR TOWN AND OUR UNIVERSE
- HUMANITIES, THE, LESSON 4, OUR TOWN AND OURSELVES
- MACBETH
- MACBETH, LESSON 1, THE POLITICS OF POWER
- MACBETH, LESSON 2, THEMES OF MACBETH
- MACBETH, LESSON 3, THE SECRET'EST MAN
- OEDIPUS REX, LESSON 1, THE AGE OF SOPHOCLES
- OEDIPUS REX, LESSON 2, THE CHARACTER OF OEDIPUS
- OEDIPUS REX, LESSON 3, MAN AND GOD
- ORPHEUS AND EURYDICE
- SEAN O'CASEY
- SHAKESPEARE - SELECTION FOR CHILDREN
- UNE JOURNEE A LA COMEDIE-FRANCAISE

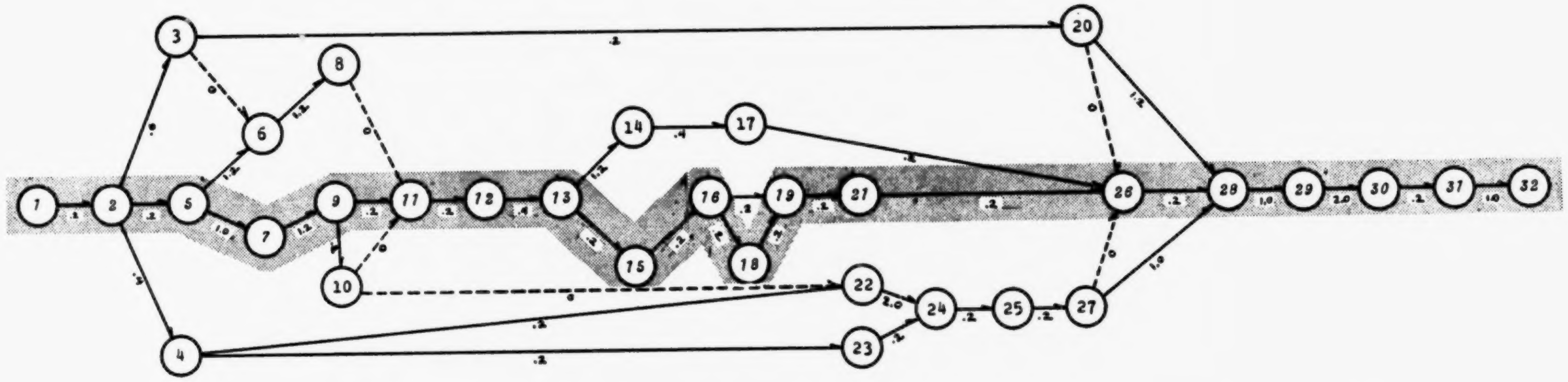
MUSIC - PRINCIPLES AND INSTRUMENTS

- AUTOHARP, THE
- B FLAT CLARINET, THE - THE CARE AND ASSEMBLY OF THE B FLAT CLARINET
- BRASS CHOIR, THE (2ND ED)
- CONDUCTING GOOD MUSIC
- ELEMENTS OF COMPOSITION
- HARMONY IN MUSIC
- INTRODUCING THE BRASSES
- INTRODUCING THE WOODWINDS
- IT'S FUN TO SING
- JOSE ITURBI, PROGRAM 2
- MILDRED DILLING
- MUSIC EDUCATION WORKSHOP, A
- MUSIC IN THE WIND
- PERCUSSION - THE PULSE OF MUSIC
- PERCUSSION GROUP, THE (2ND ED)
- PITCH PIPE, THE
- PLAYING GOOD MUSIC - THE STRING QUARTET
- SCIENCE OF MUSICAL SOUNDS, THE

PRODUCERS' CODES

AAR	ASSN OF AMER RAILROADS
ABCTV	AMER BROADCASTING CO, TV
AC	AUERBACH CORP
ACA	ACADEMY FILMS
ACE	AMER CINEMA EDITORS, INC
ACOC	ARMSTRONG CORK CO
ADL	ANTI-DEFAMATION LEAGUE OF B-NAI B-RITH
AF	ASSN FILMS
AFF	AFFILIATED FILM PRODUCERS
AFFLMS	A F FILMS
AFLM	ASSN FILMS AND LOOK MAGAZINE
ALCOA	ALUMINUM CO OF AMERICA
ALLMOR	ALLEN-MOORE
AMB	AMBASSADOR FILMS
AMBERG	WILLIAM AMBERG
AMSDEN	CONSTANCE E AMSDEN
ANAIB	AUSTL NEWS AND INFORMATION BUREAU
ANDERS	WILLIAM A ANDERSON
ANDSON	ROBERT ANDERSON
APTA	AMER PHYS THERAPY ASSN
ARCO	ARCO FILMS
ARGO	ARGO FILMS INC
ARTHUR	GEORGE K ARTHUR - GO PICTURES
ARTS	ARTS AND AUDIENCES, INC
ATLAP	ATLANTIS PRODUCTIONS, INC
ATV	ASSOCIATED TV CO LTD
AUDIO	AUDIO PRODUCTIONS, INC
AVED	AV-ED FILMS
AVIS	AVIS FILMS
BACH	FRANK BACH
BACHRR	BACH - RANDALL
BAILEY	BAILEY FILMS, INC
BARWOC	HAL BARWOOD
BECK	LESTER BECK
BELL	BELL TELEPHONE CO
BEVR	JAMES BEVERIDGE
BFI	BRITISH FILM INSTITUTE
BIOF	BIOFILM
BIS	BRITISH INFORMATION SERV
BLA	GENE BLAKELY PRODUCTIONS
BMOI	BRITISH MINISTRY OF INFORMATION
BONNIE	BONNIE PICTURES
BOUWM	GEORGE BOUWMAN
BRADLY	RUTH BRADLEY
BREST	GEORGE BREST AND CO
BRO	ROBERT BROWN
BROUH	MARCEL BROUHON
BRYAN	JULIEN BRYAN
BTF	BRITISH TRANSPORT FILMS
BURN	PAUL BURNFORD
BYE	JUSTIN AND BYERS
CACC	CALIF CENTRAL COMMISSION
CAHILL	CHARLES CAHILL AND ASSOC, INC
CALVIN	CALVIN PRODUCTIONS
CARFI	CARAVEL FILMS, INC
CARLIL	FORBES CARLILE
CARRD	DOUG CARR
CBSTV	COLUMBIA BROADCASTING CO
CDOL	CANADIAN DEPT OF LABOR
CENCO	CENCO EDUCATIONAL FILMS
CENTRO	CENTRON CORP
CEP	CAMERA EYE PICTURES
CF	CHURCHILL FILMS
CFD	CLASSROOM FILM DISTRIBUTORS, INC
CHILDF	CHILDREN'S FILM FOUNDATION
CHRSTN	FRED CHRISTIAN
CIT	CALIF INSTITUTE OF TECHNOLOGY
CJCA	CALIF JR COLLEGE ASSN
CMC	CENTER FOR MASS COMMUNICATION OF COLUMBIA UNIV PRESS
COHEN	ROBERT COHEN
COLBRN	JOHN COLBURN ASSOC, INC
COLLRD	JARVIS COUILLARD ASSOC
CON	CONTEMPORARY FILMS
CONANT	THEODORE CONANT
CORF	CORONET FILMS
CPC	COLUMBIA PICTURE CORP
CRAF	CRAWLEY FILMS LTD
CULLEN	ECWARD F CULLEN
CW	CHURCHILL-WEXLER FILM PRODUCTION
CWCE	CENTRAL WASHINGTON COLLEGE OF EDUCATION
DAGP	AVALON DAGGETT PRODUCTIONS
DATA	DATA FILMS
DAVP	SID DAVIS PRODUCTIONS
DAWSON	LARRY DAWSON PRODUCTIONS
DEFREN	DE FRENES CO
DEROCH	LOUIS DE ROCHEMONT ASSOC
DF	DIMENSION FILMS
DISF	DISCOVERY FILMS
DISNEY	WALT DISNEY PRODUCTIONS
DOWP	PAT DOWLING PICTURES
DUART	DU ART FILM LABS, INC
DUNCAN	PHIL DUNCAN
EAMES	CHARLES AND RAY EAMES
EBF	ENCYCLOPAEDIA BRITANNICA FILMS
ECIS	EUROPEAN COMMUNITY INFORMATION SERV
EDVENT	ED-VENTURE FILMS
EFCA	EDUCATIONAL FILM CORP OF AMERICA
EFVA	EDUCATIONAL FOUNDATION FOR VISUAL AIDS
EH	EDUCATIONAL HORIZONS
ELJO	ELJO PRODUCTIONS
EMW	EMPLOYERS MUTUAL OF WAUSAU
ETP	ETIWANDA PRODUCTIONS
ETS	EDUCATIONAL TESTING SERV
EVA	GRANT EVANS
EVAN	MARIAN EVANS
EVANSA	ARTHUR EVANS
EWI	NORRIS EWING FILMS
FDF	FORD FOUNDATION
FINA	FINE ARTS PRODUCTIONS
FITZ	FITZPATRICK PICTURES
FOSTER	WALTER FOSTER ART FILMS
FRANK	LAWRENCE P FRANK JR
FRIS	MARGARETTA B FRISTOE
FRITH	FRITH FILMS
FRYE	FRYE-CIRLIN PRODUCTIONS
FURMAN	WILLIAM FURMAN
GANZ	WILLIAM J GANZ
GAYEK	JOSEPH GAYEK
GD	GENERAL DYNAMICS CORP
GE	GENERAL ELECTRIC
GGKA	GOLDEN GATE KINDERGARTEN ASSN
GJP	GROVER-JENNINGS PRODUCTIONS
GOLD	GARY GOLDSMITH
GRUBBS	HARRY GRUBBS
GUM	S WILLIAM GUMBINER
HA	BERT HAANSTRA
HAGOPN	J MICHAEL HAGOPIAN
HALAS	HALAS AND BATCHELOR
HAM	E E HAMMOND
HANDEL	HANDEL FILM CORP
HANDY	JAM HANDY ORGAN
HANSON	DAVID HANSON
HARL	WILLIAM M HARLOW
HARRY	RAY HARRYHAUSSEN
HAS	GUY D HASELTON
HAT	CHARLES HATHAWAY
HAZAM	LOUIS J HAZAM
HEF	HELEN HEFFERNAN
HH	HILTON HOTELS
HL	HAWLEY-LORD PRODUCTIONS
HOGE	EDISON HOGE
HOLMES	BURTON HOLMES
HORIZN	HORIZON FILMS
HP	HARTLEY PRODUCTIONS
HRAW	HOLT, RINEHART AND WINSTON
HYATT	DONALD HYATT
IFB	INTERNATIONAL FILM BUREAU
IFF	INTERNATIONAL FILM FOUNDATION
IH	INTERNATIONAL HARVESTER CO
INFORF	INFORMATION FILMS
INVINC	INVINCIBLE STUDIOS

AUTOMATED CATALOG



EVENT		ACTIVITY
Pre.	Suc.	Description
1	2	*Print-our master title list from latest master tape.*
2	3	Establish catalog format and list department codes and grade levels.
2	5	*Mail title list - personal call for instructions on use.*
2	4	Develop subject matter outline.
3	6	Dummy activity.
5	6	Check master title list and mark according to department inventory. (Key punch directions).
5	7	*List missing titles*
6	8	Prepare call cards (Punch by computer programing).
3	20	Prepare programing for print-out formats.
4	22	Prepare call cards and interpret.
4	23	Key punch subject headings
7	9	*Compile data for materials not on the master list.*
9	10	Make call cards.
8	11	Dummy activity.
10	11	Dummy activity.

EVENT		ACTIVITY
Pre.	Suc.	Description
9	11	*Upgrade master tape.*
11	12	*Integrate new call cards and check alphabetical order.*
12	13	*Proof new list and make corrections.*
13	14	Compare and check for producer codes and hold applicable codes for department list.
13	15	*Compare master tape with department list for series references. Hold appropriate series and prepare tape.*
14	17	Check against producer cards - make needed corrections.
15	16	*Prepare series title listing, call cards, title cards.*
16	18	*Check series cards against master tape, correct and upgrade.*
16	19	*Merge series cards with call cards (Dept.)*
17	26	Print-out - Producer codes.
18	19	*Integrate series in master tape (Dept.)*
19	21	*Check call cards against master tape.*
21	26	*Print-out master alphabetical list for department.*

EVENT		ACTIVITY
Pre.	Suc.	Description
22	24	File subject cards.
23	24	File subject headings cards.
24	25	Print-out a Subject list - Proof corrections.
25	27	Print-out final subject list.
20	26	Dummy activity.
27	26	Dummy activity.
20	28	Prepare foreward and table of contents and other information.
27	28	Graphic arts production.
26	28	*Final catalog design.*
28	29	*Photo reproduction process.*
29	30	*Offset printing - Binding.*
30	31	*Deliver catalogs to department.*
31	32	*Prepare and deliver to schools.*

APPENDIX C

THE SURVEY OF COUNTY INSTRUCTIONAL MATERIALS CENTERS IN CALIFORNIA, INCLUDING: THE SAMPLE QUESTIONNAIRE, AND TABLES SHOWING A COMPILATION OF MATERIALS AND SERVICES FROM THE STATE DEPARTMENT OF EDUCATION, BUREAU OF AUDIO-VISUAL AND SCHOOL LIBRARY EDUCATION SURVEY.

VALLEY INSTRUCTIONAL TELEVISION ASSOCIATION

Dear Colleague,

In order to provide background information relevant to my study, "Automating Instructional Materials Center Procedures" (tentative), I would appreciate receiving information on the following:

1. Number of persons employed in the IMC (particularly those who are responsible for processing motion picture films).__________
2. Number of motion picture titles in your center.________
3. Number of motion picture prints in your center.________
4. Approximate annual budget for motion picture prints in your center.______________
5. Approximate average daily attendance served by your center.__________
6. Approximate number of schools in your service pool._____
7. Approximate number of teachers served by your center. __________
8. Longest distance traveled by your deliverymen.__________
9. Period(s) of booking: Check appropriate one(s)
   ______Weekly ______Daily ______Twice Weekly ______Other (explain)______________________________
10. Approximate percentage (of total bookings) of film requests honored for first choice requested.__________
11. Approximate percentage (of total bookings) of film requests honored on alternate choices (those beyond #10).__________

For your convenience, space is provided on this sheet for your responses.

It is recognized that this may be an additional burden upon your busy schedule; however, I do hope you will find time to complete this at your earliest convenience.

For your information, this study is financed through a USOE NDEA Title VII grant. The final report will be available for your use.

Please fold and staple so return address is visible on the reverse side.

Sincerely,

Name____________________
Organization____________________
____

Charles J. Vento

Address____________________
____

CTV:go

TABLE I

AV Materials & Related Services, as Reported, 1967-68--Group I Counties*

County	Types of Materials in Library		No. of Deliveries to Each school Per Week	Services Offered			a.d.a. Served (Prior Year)	AV Items in Library	AV Items Booked (Prior Year)	Bookings Per Item in Library (Average--Prior Year)
	AV Only	AV & Sch. Library		Photo-graphic	Graphic Art	Maint. of District Equip-ment				
Amador	X		1				2,584	1,546	4,960	3.2
Calaveras	X		1	X		X	2,605	7,718	7,873	1.0
El Dorado		X	2(Elem.Only)			X	11,811	4,952	18,908	3.8
Glenn		X	1			X	5,168	5,020	16,784	3.3
Inyo		X	1			X	5,176	5,356	5,167	1.0
Kings		X	1	X			17,334	6,039	14,580	2.4
Lassen		X	1	X	X		5,120	9,055	17,000	1.9
Madera		X	1			X	10,960	15,477	13,922	.9
Mariposa		X	1			X	1,100	2,363	1,356	.6
Mendocino		X	1			X	16,261	7,040	27,465	3.9
Modoc		X	1	X			1,787	16,319	13,080	.8
Mono		X	1				764	605	523	.9
Napa		X	1				19,527	3,926	17,987	4.6
Plumas	X		1			X	3,180	3,678	7,094	1.9
Siskiyou	X		1				8,361	3,979	21,000	5.3
Sutter		X	5			X	18,825	9,285	30,648	3.3
Tehama		X	1				7,327	3,438	7,146	2.1
Trinity		X	1			X	1,880	3,513	3,700	1.1
Tuolumne**		X	1				4,300	1,773	8,000	4.5
Yolo		X	1			X	19,244	11,300	32,228	2.9
Total	4	16		4	1	11	160,314	122,382	269,421	

*Counties serving less than 20,000 students.
** Data are estimates based on most recent reports available prior to 1967-68

TABLE II

AV Material and Related Services, As Reported, 1967-68--Group II Counties

County	Types of materials in Library		Services Offered				a.d.a. Served	AV Items in Library	AV Items Booked (Prior Year)	Bookings per item in Library (Average--Prior Year)
	AV Only	AV&Sch. Library	No. of Deliveries to Each Sch. Per Week	Photo-graphic	Graphic Art	Maint. of District Equipment				
Butte		X	1			X	23,774	6,622	37,601	5.7
Humboldt	X		-0- (Mail)	X			32,681	7,673	43,147	5.6
Imperial	X		1			X	24,022	8,139	28,413	3.5
Marin		X	1	X	X		47,703	11,485	63,019	5.5
Merced		X	1				33,034	10,570	75,960	7.2
Placer		X	1			X	23,175	6,683	35,927	5.4
San Luis Obispo		X	1				23,275	11,639	25,812	2.2
Santa Cruz		X	1			X	27,939	16,722	30,809	1.8
Shasta**		X	1			X	22,000	4,213	12,790	3.0
Sonoma		X	1	X	X	X	45,298	11,663	67,986	5.8
Solano		X	1	X			30,000	6,285	38,000	6.0
Total	2	9		4	2	6	332,901	101,694	459,464	

---

*Counties Serving 20,000-49,000 a.d.a.

**Data are estimates based on most recent reports available prior to 1967-68.

TABLE III

AV Materials and Related Services, As Reported, 1967-68--Group III Counties*

County	Types of Materials in Library		Services Offered				a.d.a. Served (Prior Year)	AV Items in Library	AV Items Booked (Prior Yr.)	Bookings per Item in Library (Average--Prior Year)
	AV Only	AV & Sch. Library	No. of Deliveries To ea. Sch. Per Week	Photographic	Graphic Art	Maint. of District Equip.				
Contra Costa**	X		1				97,865	16,458	82,650	5.0
Kern		X	1	X	X	X	69,636	10,226	55,501	5.4
Monterey		X	1			X	58,000	10,250	55,700	5.4
Riverside***		X	1				60,906	6,508	61,988	9.5
Sacramento		X	2	X		X	60,973	18,742	59,377	3.2
Santa Barbara	X		1				58,000	6,248	60,000	9.6
San Joaquin		X	1	X	X		75,000	9,485	71,965	7.6
Stanislaus		X	5	X	X		51,928	8,623	41,538	4.8
Tulare	X		1			X	51,790	20,668	55,555	2.7
Ventura	X		1				94,531	14,048	101,614	7.2
Total	4	6		4	3	4	678,629	121,206	645,888	

---

*Counties serving 50,000-99,999 a.d.a.

**Data are estimates based on most recent reports available prior to 1967-68

***Circulates 16mm films only

County	Types of Materials In Library		Services Offered				a.d.a. Served	AV Items in Library	AV Items Booked (Prior Year)	Bookings Per Item in Library (Average--Prior Year)
	AV Only	AV & Sch. Library	No. of Deliveries to Each School Per Week	Photo-graphic	Graphic Art	Maint. of District Equip-ment				
Alameda		X	1	X		X	121,402	17,855	123,202	6.9
Fresno	X		1	X	X		112,545	41,297	130,344	3.6
Los Angeles**		X	1			X	731,587	35,332	165,600	4.7
Orange	X		1				314,446	18,728	147,092	7.9
San Bernardino*	X		1				140,000	5,500	45,775	8.4
San Diego	X		1	X	X		108,000	47,226	197,071	4.2
San Francisco		X	1			X	103,762	29,424	52,756	1.8
San Mateo**	X		1				132,000	15,399	70,000	4.5
Santa Clara	X		5				337,571	16,937	339,518	20.4
Total	6	3		3	2	3	2,101,313	227,698	1,271,358	

---

*Counties serving 100,000 or more ADA.

**Circulate only the more expensive items such as 16mm films.

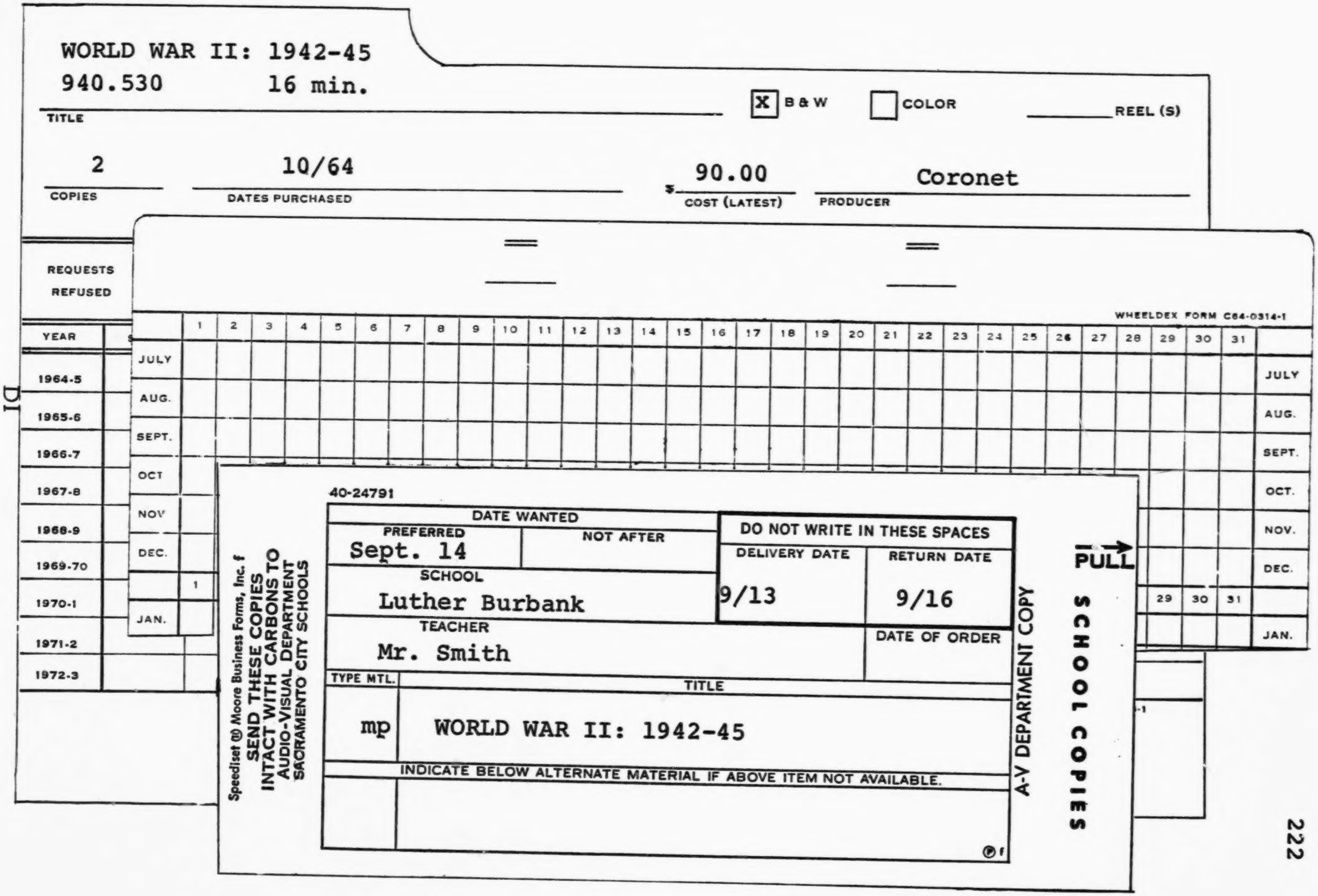
APPENDIX D

SAMPLE MATERIALS USED IN PROCESSING INSTRUCTIONAL MATERIALS IN THREE SELECTED CENTERS:

(1) SACRAMENTO UNIFIED SCHOOLS,

(2) ALAMEDA COUNTY SCHOOLS, AND

(3) LOS ANGELES COUNTY SCHOOLS



WORLD WAR II: 1942-45
940.530 16 min.
TITLE

☒ B & W ☐ COLOR ______ REEL (S)

2
COPIES

10/64
DATES PURCHASED

$ 90.00
COST (LATEST)

Coronet
PRODUCER

REQUESTS REFUSED

YEAR
1964-5
1965-6
1966-7
1967-8
1968-9
1969-70
1970-1
1971-2
1972-3

WHEELDEX FORM C64-0314-1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
JULY																																JULY
AUG.																																AUG.
SEPT.																																SEPT.
OCT																																OCT.
NOV																																NOV.
DEC.																																DEC.
	1																												29	30	31	
JAN.																																JAN.

Speediset ® Moore Business Forms, Inc. f
SEND THESE COPIES
INTACT WITH CARBONS TO
AUDIO-VISUAL DEPARTMENT
SACRAMENTO CITY SCHOOLS

40-24791

DATE WANTED		DO NOT WRITE IN THESE SPACES	
PREFERRED	NOT AFTER	DELIVERY DATE	RETURN DATE
Sept. 14		9/13	9/16

SCHOOL
Luther Burbank

TEACHER
Mr. Smith

DATE OF ORDER

TYPE MTL.	TITLE
mp	WORLD WAR II: 1942-45

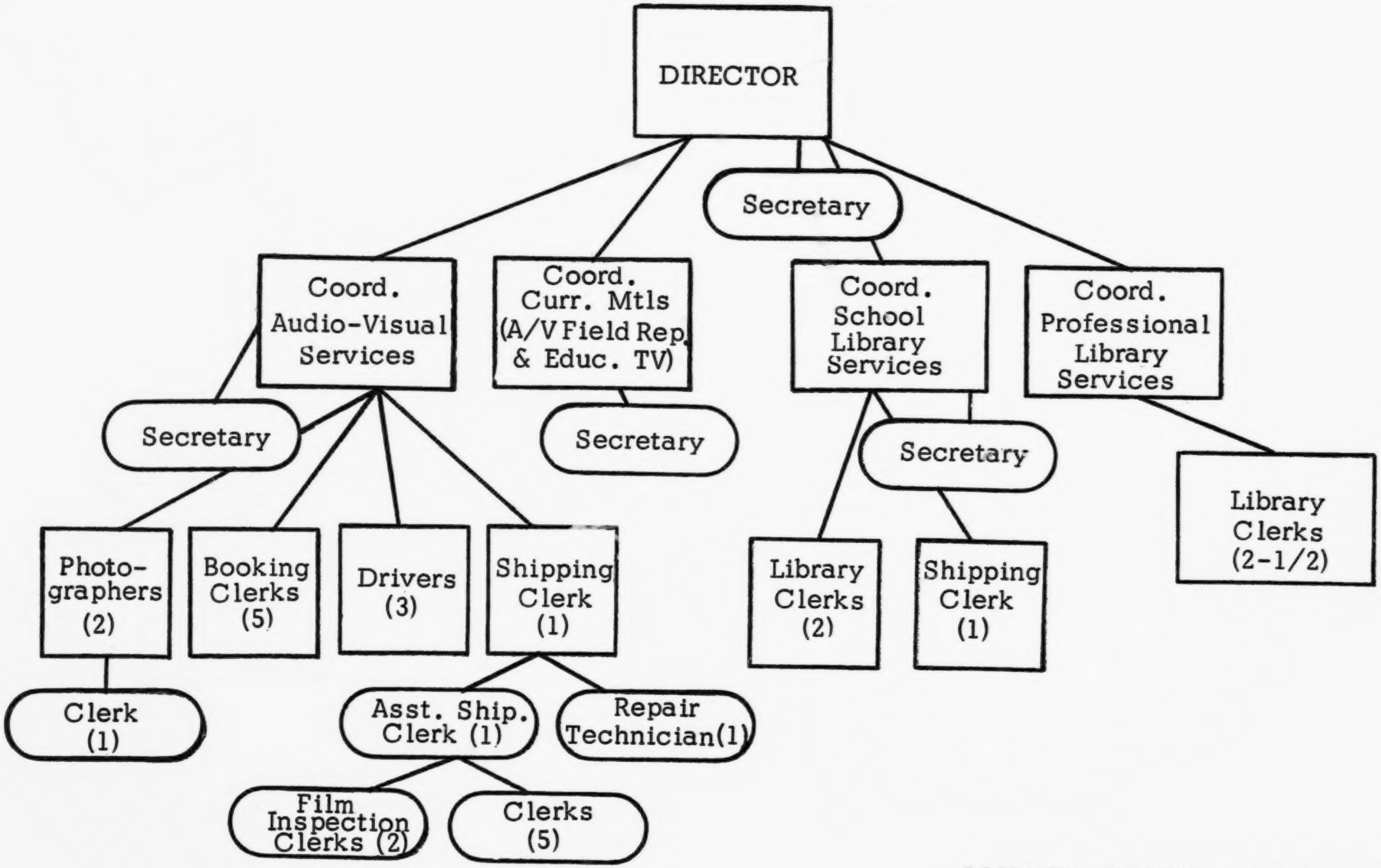
INDICATE BELOW ALTERNATE MATERIAL IF ABOVE ITEM NOT AVAILABLE.

A-V DEPARTMENT COPY

PULL

SCHOOL COPIES

ORGANIZATIONAL CHART


DIRECTOR
Secretary
Coord. Audio-Visual Services
Coord. Curr. Mtls (A/V Field Rep. & Educ. TV)
Coord. School Library Services
Coord. Professional Library Services
Secretary
Secretary
Secretary
Library Clerks (2-1/2)
Photo-graphers (2)
Booking Clerks (5)
Drivers (3)
Shipping Clerk (1)
Library Clerks (2)
Shipping Clerk (1)
Clerk (1)
Asst. Ship. Clerk (1)
Repair Technician(1)
Film Inspection Clerks (2)
Clerks (5)

ALAMEDA COUNTY SCHOOLS OFFICE
Curriculum Materials Center

INCORPORATION OF NEW STOCK NOTICE

STOREKEEPER
ADDRESSOGRAPH OPERATOR
BOOKING CLERK
STOREKEEPER

DATE 29 Nov 1966

Code No.	Title	No. Copies	Time	Color	Speed	Size	Location
MP-2475	OPERATION FREIGHTER	3	20 min.	X			

This completed form to be kept in a permanent file by the Storekeeper.

D3

MP-2475 OPERATION FREIGHTER
20 min (color) SSAL

West bound freighters sail between San Francisco and Honolulu will carry cargo made up of such items as machinery and frozen meats. East bound their manifests will include items like canned pineapple and coffee.

DATE OF INCORPORATION: 29 Nov 1966 CR 1966

SOURCE: Walt Disney Prod (Paul Hoefler)

SOURCE'S CATALOG NUMBER: none

ANNUAL INVENTORY					
1962		1973		1984	
1963		1974		1985	
1964		1975		1986	
1965		1976		1987	
1966	3	1977		1988	
1967	3	1978		1989	
1968		1979		1990	
1969		1980		1991	
1970		1981		1992	
1971		1982		1993	
1972		1983		1994	

Date	Code	Action	PO NR	Credit	Debit	Balance	Initial Stkepr	Initial Booking
11/29/66	A		1334	3		3	P.H.	

ALAMEDA COUNTY SCHOOLS
Rock LaFleche, Superintendent

AUDIO-VISUAL ORDER FORM

CURRICULUM MATERIALS CENTER
224 West Winton Avenue, Hayward, Calif. 94544

SCHOOL Cherryland DIST. Hayward

REQUESTED BY Robert Brown

DATE REQUESTED FROM Oct 9

TO Oct 16

WILL CALL ☐

DELIVER ☒ BUT NOT AFTER Oct 30

Please do not write in this space
FOR C.M.C. USE ONLY

DELIVERY DATE 9 Oct 68

DUE BACK 16 Oct 68

NOTE: Please **print clearly**, or type, a **separate** form for EACH WEEK'S ORDER. TEACHER retain last copy—forward other copies to the Curriculum Materials Center

D 5

Do not write in this space FOR C.M.C. USE ONLY			
Drivers (✓)	Booked as Requested (✓)	SERIAL NUMBER	TITLE
	✓	MP-2475	Operation Freighter

CODE:
1. Not Available on Dates Requested
2. Removed From Service
3. Being Repaired
4. Not Available Rest of Term
5. Not in Our Library
6. Substitution
7. Already Assigned to Your School
8. Cannot Identify
9. Not Returned from Previous User
10. Booked Within Alternate Dates

NOTE: All materials listed hereon must be returned on the date due back, unless previous arrangements have been made with the Curriculum Materials Center to retain them for a longer period.

Received by:

VEM 7-1

MP-2475
SERIAL No.

Operation Freighter
TITLE

20 min
RUNNING TIME

3
PRINTS

I - U
GRADE LEVEL

X
COLOR

B & W

SPONSOR

1964-65	1965-66	1966-67	1967-68	CROSS REF.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
OCT.									← Cherryland →																						
NOV.																															
DEC.																															

ALAMEDA C NTY SCHOOLS - CURRICULUM MAT ALS CENTER

CONTRACTS FOR FILM SERVICE
1966-1967

1. Regular

ADA contract at $1.00 per ADA (based on previous year) give the amount of the contract.

Film rental charge is $3.00 per film per week.

Film quota is determined in the following manner:
ADA x $1 ÷ $3 = number of films available on contract

Grades	ADA as Taught	Amount
Kindergarten		
1 - 6		
7 - 8		
9 - 12		
13 - 14		
Adult Education		
Total		

If quota is used before the year is over, additional films may be ordered at same rate by sending a written notice.

2. Limited

Contract for This Amount		Covers This Number of Films	Rate - Cost per Film per Week
$ 4.50	$ 1,795.50	1 - 399	$4.50
1,700.00	2,970.75	400 - 699	4.25
2,800.00	3,996.00	700 - 999	4.00
3,750.00	7,496.25	1,000 - 1,999	3.75
7,000.00	10,496.50	2,000 - 2,999	3.50
9,750.00	12,996.75	3,000 - 3,999	3.25
12,000.00	and up	4,000 - and up	3.00

If there is a desire to exceed the number of films covered by the contract, additional films may be ordered at the same rate by sending a written notice.

3. Minimum

Any district with an ADA less than one hundred pays a minimum charge of $100.00 and will receive 40 films.

4. Long Term

Annual rental rate: The rate for annual rental of a film would be 1/5 of the cost of the film rounded off to the nearest dollar.

Los Angeles County Superintendent of Schools
Division of Educational Media
155 West Washington Blvd., Los Angeles 90015

Report on Film Contract Service
to Districts Participating in
Educational Media Service

Type of Contract:

ADA $________ Weekly Rental $________
Limited $ 5,250.00 Weekly Rental $ 3.75
Minimum $________

1. Film Quota 1,400 ; 5% Overage Allowance 70 ; Total Quota, 1967-68 1,470 Films.

2. . . . .

	A. Number of Films Actually Shipped		B. Total Number of Films Confirmed as of This Date	C. Balance in Quota After Deducting Films Confirmed
	(Owned)	(Sponsored)		
Jun. 20 - Aug. 31, 1967	49	1	250	1,150
Sep. 1 - Nov. 30	516	122	950	450
Dec. 1 - Jan. 31, 1968	204	82	1,050	350
Feb. 1 - Mar. 31	392	91	1,490	over quota
Apr. 1 - Jun. 14	328	122		20 films

3. Total number of films used to date: 1,489 418

Number of films over quota to be charged to district 19 films

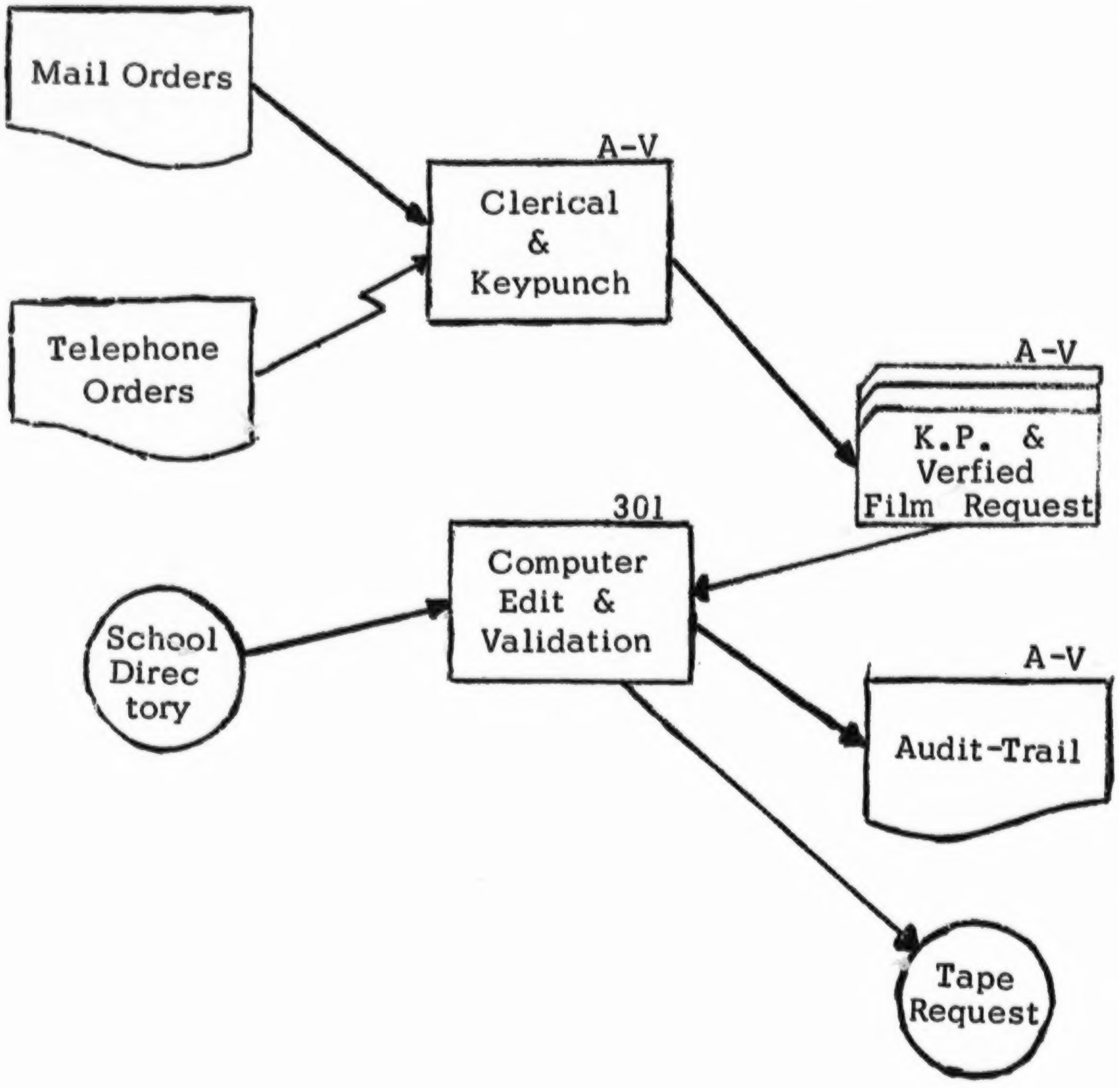
Number of films left in quota for use during summer sessions. . . . . . . none

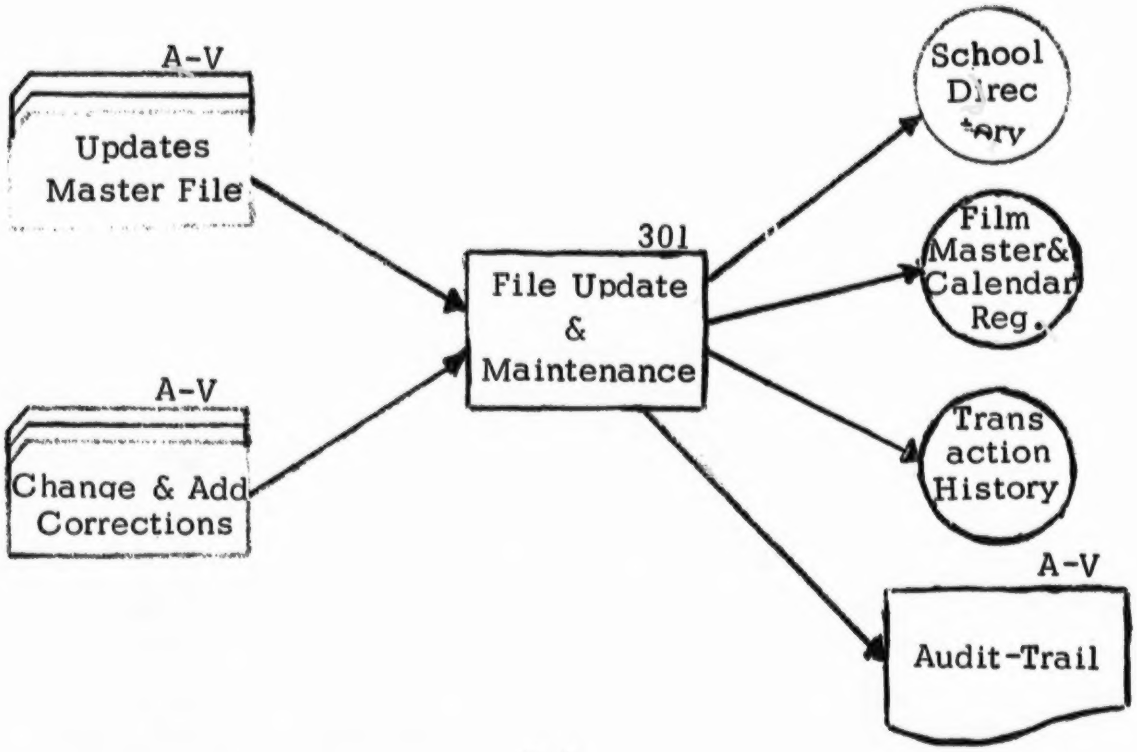
Covina Valley Unified School District
Post Office Box 269
Covina, California 91722

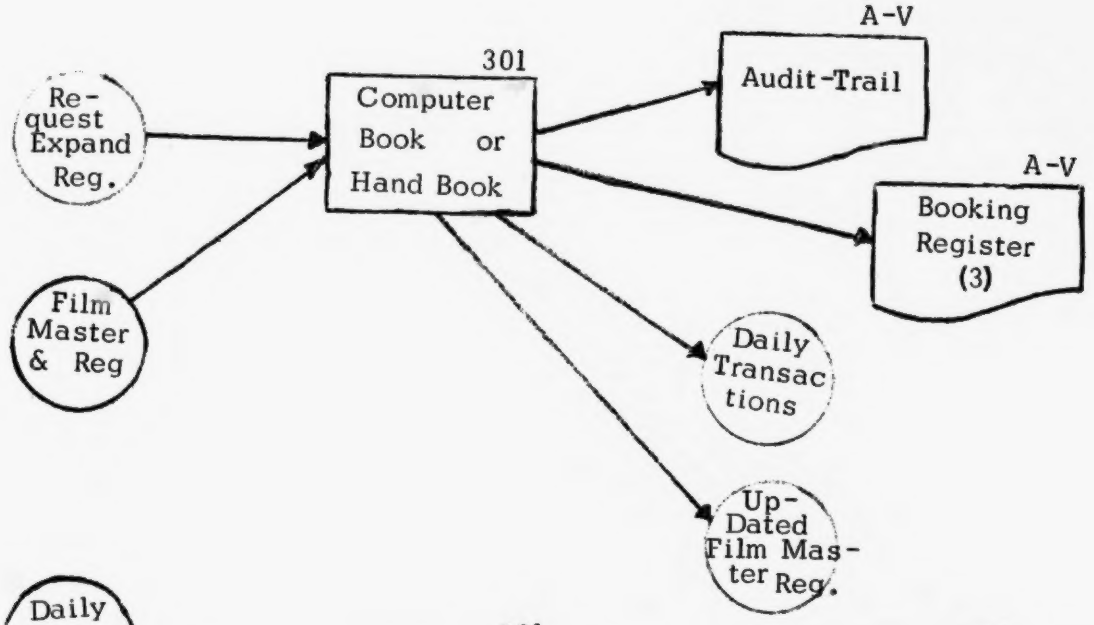
Date of this report: June 16, 1968

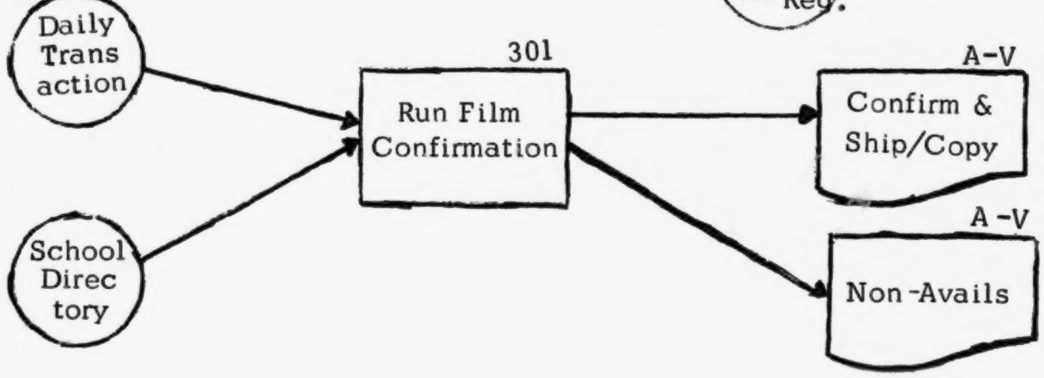
Attention: Mr. Harry Ford

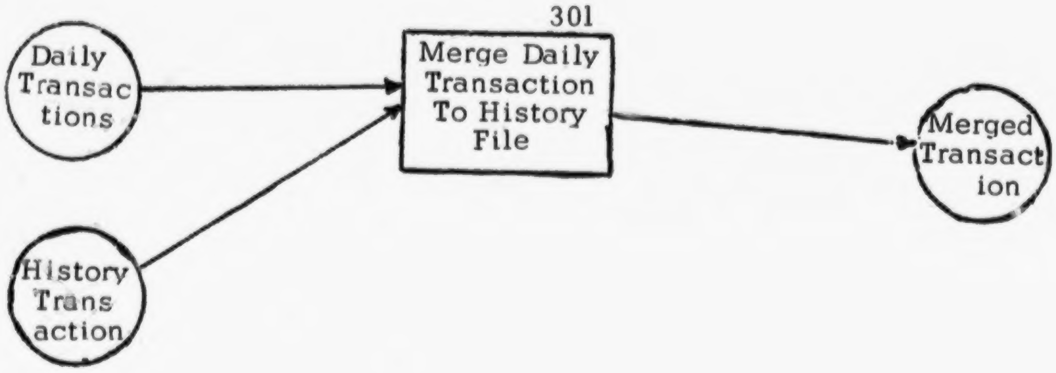
D8


Mail Orders
A-V
Clerical & Keypunch
Telephone Orders
A-V
K.P. & Verfied Film Request
301
Computer Edit & Validation
School Directory
A-V
Audit-Trail
Tape Request

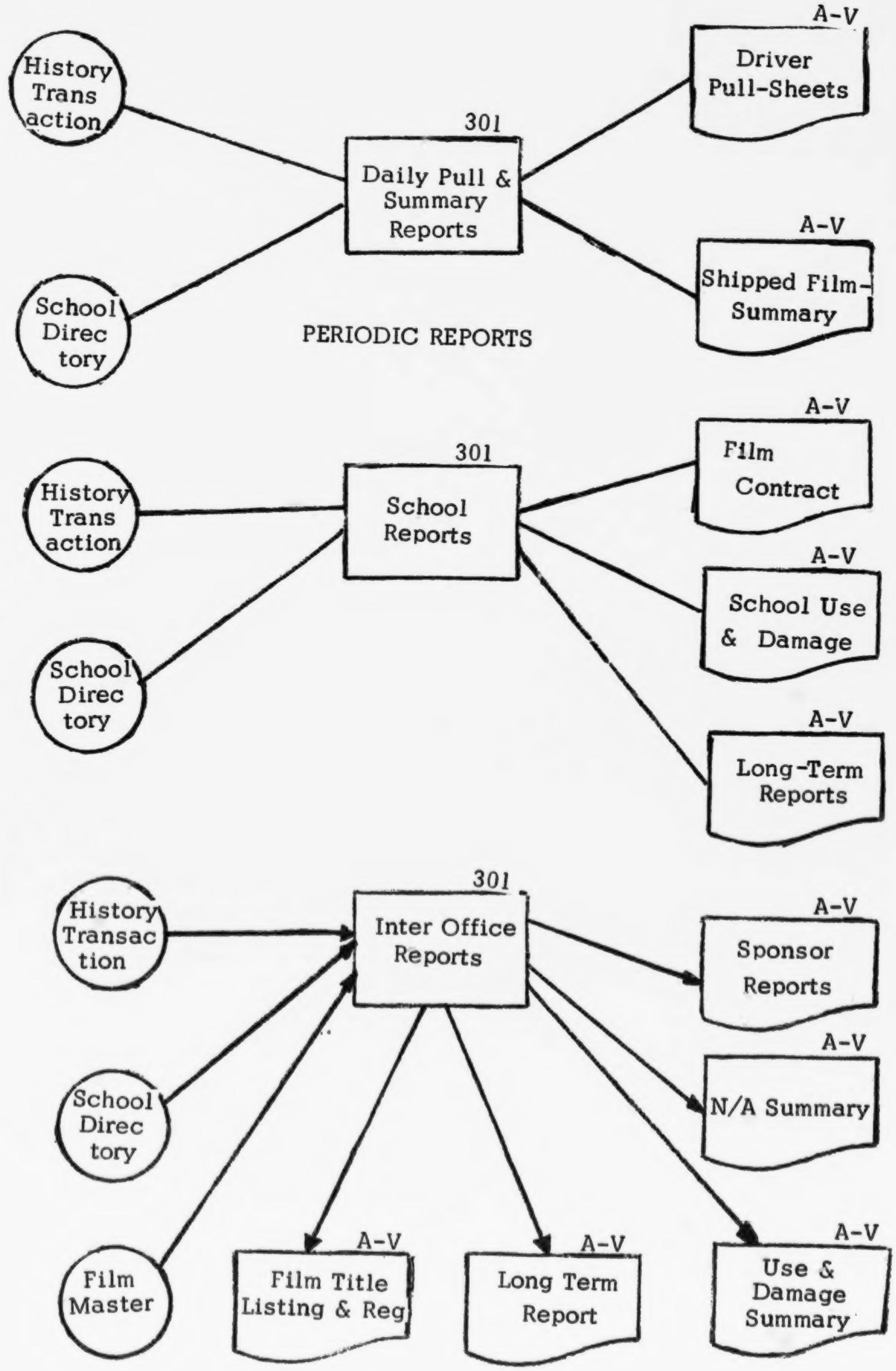

A-V
Updates Master File
School Directory
301
File Update & Maintenance
Film Master& Calendar Reg.
A-V
Change & Add Corrections
Trans action History
A-V
Audit-Trail


Re-quest Expand Reg.
Film Master & Reg
301
Computer Book or Hand Book
A-V
Audit-Trail
A-V
Booking Register (3)
Daily Transactions
Up-Dated Film Master Reg.


Daily Transaction
School Directory
301
Run Film Confirmation
A-V
Confirm & Ship/Copy
A-V
Non-Avails


Daily Transactions
History Transaction
301
Merge Daily Transaction To History File
Merged Transaction

Repeat Above For Not Available File


History Trans action
School Direc tory
301
Daily Pull & Summary Reports
A-V
Driver Pull-Sheets
A-V
Shipped Film-Summary
History Trans action
School Direc tory
301
School Reports
A-V
Film Contract
A-V
School Use & Damage
A-V
Long-Term Reports
History Transac tion
School Direc tory
Film Master
301
Inter Office Reports
A-V
Sponsor Reports
A-V
N/A Summary
A-V
Film Title Listing & Reg
A-V
Long Term Report
A-V
Use & Damage Summary

PERIODIC REPORTS

APPENDIX E

MAJOR PROBLEMS IN USING AUDIOVISUAL MEDIA

MAJOR PROBLEMS IN USING AUDIOVISUAL MEDIA PRINCIPALS, COORDINATORS, AND TEACHERS FOR ELEMENTARY AND SECONDARY SCHOOLS

Type of Problem	Percent of Respondents Reporting Problem(s)					
	Elementary Schools			Secondary Schools		
	Principals	Coordinators	Teachers	Principals	Coordinators	Teachers
Number of Respondents	308	134	4,166	209	157	6,464
Too little preview time	68%	74%	61%	70%	71%	63%
Poor classroom setup	56	55	44	57	69	50
Few good materials	52	53	21	66	66	34
Aids not available when needed	45	43	44	52	48	47
Too little information	33	30	26	38	40	28
Difficult to integrate materials	28	25	17	47	41	26
Students see as entertainment	19	19	20	28	26	33
Not enough basic teaching time	20	20	25	16	20	30
Too much "red tape"	12	5	23	14	16	34
Aids too expensive for results achieved	9	10	9	12	14	17
Equipment in poor repair	7	6	9	6	11	14
Difficult to operate equipment	7	7	11	3	6	8
Have no difficulties	7	6	8	-	2	5

BIBLIOGRAPHY

BIBLIOGRAPHY

Anderak, Paul A., *et al. The Feasibility of a Cooperatively-Owned Multi-Purpose, Multi-Channel, Closed-Circuit Television System for Instruction, Materials Distribution, and Administrative Data Handling.* A Report of the North Circle Pilot Project, Phase A. (OE4-16-024) St. Louis County, Missouri: 1965.

Baillif, Ernest A. "An Investigation of Methods of Predicting the Performances of Automatic Controls," *Dissertation Abstracts*, XIII, No. 6 (1953), 1139.

Barnard, David P. "A Study of the Audio-Visual Administrative and Supervisory Functions in Selected Schools of Vocational and Adult Education in Wisconsin," *Dissertation Abstracts*, XV, No. 11 (1955), 2069.

Belanger, Maurice. "Discussion, Educational Technology: New Myths and Old Realities," *Harvard Educational Review*, 38, No. 4 (Fall, 1968), 719-24.

Bitzer, Donald, Lyman, Elisabeth, and Easley, John. "The Uses of PLATO: A Computer-Controlled Teaching System," *Audiovisual Instruction*, II, No. 1 (January, 1966), 16-21.

Borg, Walter R. *Educational Research: An Introduction.* New York: David McKay Company, Inc., 1963.

Borko, Harold. *Computer Applications in the Behavioral Sciences.* New Jersey: Prentice-Hall, Inc., 1962.

Boulgarides, J. D., and San Filippo, V. C. "The Dilemma of Technical Obsolescence," (Paper No. 4614 M), Douglas Missile and Space Division (October, 1967).

Brickell, Henry M. *Organizing New York State for Educational Change.* A Report Prepared by the University of the State of New York. Albany, New York: State Department of Education, December, 1961.

Brish, William. "Administrative Changes Dictated by Research in Newer Educational Media," *Newer Educational Media.* Pennsylvania State University in Cooperation with the United States Department of Health, Education and Welfare (1961), 104.

Brown, James W., and Aubrey, Ruth H. "New Media and Changing Educational Patterns," in *A Summary of the Presentation and Reports of the New Media Workshop.* Sacramento, California: State Department of Education, 1965.

Brown, James W., and Norberg, Kenneth. *Administering Educational Media.* New York: McGraw-Hill Book Company, 1965.

Brown, James W., and Thornton, James W., Jr. *New Media in Higher Education.* Washington, D. C.: Association for Higher Education and Division of Audiovisual Instructional Services, National Education Association, 1963.

Brummitt, Bruce R., Jr. "The Impact of Machine Data Processing Systems on the Central Schools of New York State," *Dissertation Abstracts*, XXVI, No. 10 (April, 1966), 5806.

Buley, H. C. "Multimedia Systems of Instruction," *Audiovisual Instruction*, X, No. 5 (May, 1965), 391-2.

Burns, John L. "Our Era of Opportunity," *Saturday Review*, January 14, 1967, 38-9.

Bushnell, Donald D., and Cogswell, John F. "A Computer-Based Laboratory for Automation in School Systems," *Audio Visual Communication Review*, IX, No. 4 (July-August, 1961), 173-85.

Bushnell, Donald D. "Computer Assisted Instruction: A Summary of Research Programs," in *Automated Education Handbook.* Detroit, Michigan: Automated Education Center, 1965.

________. "Role of Computers in Future Instructional Systems," *Audio Visual Communication Review*, II, No. 2 (March-April, 1963), 70.

________, deMille, R., and Purl, J. "The Application of Computer Technology to the Improvement of Instruction and Learning," in *Educational Implications of Technological Change.* (Appendix VIV of Technology and the American Economy) Washington, D. C.: Superintendent of Documents, February, 1966.

California State Department of Education. *California Administrative Code: Title 5, Education.* Sacramento, California: June, 1960.

_______. *Guide for Cooperative Evaluation of County and District Audio-Visual Programs.* (Prepared by the Bureau of Audio-Visual and School Library Education in Cooperation with the Audio-Visual Education Association of California.) Sacramento, California: 1967.

Choksy, N. H. "Feedback and Stability," in *Operations Research and Systems Engineering.* Edited by C. D. Flagle, W. H. Huggins, and R. H. Roy. Baltimore: Johns Hopkins Press, 1960.

Christian, William C. "Retrieval System Disseminates Medical Information," *Systems*, VII, No. 11 (1966), 16-19, 54.

Churchman, C. West. "On the Design of Educational Systems," *Audiovisual Instruction*, X, No. 5 (May, 1965), 361-5.

Columbia Broadcasting Corporation. "Twenty-First Century." A Series of Telecasts, 1967.

Compendium of Visual Displays. (Second Revision) Rome Air Development Center, Griffins Air Force Base, New York: Research and Technology Division, Air Force Systems Command, United States Air Force, March, 1967.

Computers and Automation. XIV, No. 11 (November, 1965), entire issue.

Conti, George L. "The Administration of the Audio-Visual Programs in the Cleveland Public Schools," *Dissertation Abstracts*, XXV, No. 11 (May, 1965), 6326.

Cox, Robert A. "Is Your Library Ready for Automation?" *Audiovisual Instruction*, VI, No. 10 (December, 1961), 512-14.

Cummings, Martin M. "Health Sciences (MEDLARS)," in *Electronic Information Handling.* Washington, D. C.: Spartan Books, Inc., 1965.

Draeger, K. W. "Organizing a Computer Service Center to Supply Employee Motivation," *Data Processing Magazine*, VII, No. 11 (November, 1965), 30.

Dubridge, Lee. "Education and Social Consequences," in *Automation and Technological Change.* Edited by John T. Dunlop. New Jersey: Prentice-Hall, Inc., 1962.

Eboch, Sidney C. "A Process and Systems Structure for the Field of Audio-Visual Communication." (Unpublished Doctoral Dissertation) School of Education, University of Southern California: June, 1962.

Educational Television for California. Sacramento, California: California Television Advisory Committee, 1966.

Elliott, Charles A. "A-V Materials Used in Industrial Education in the Secondary Schools of Illinois," *Dissertation Abstracts*, XIII, No. 6 (University of Missouri, 1953), 1035.

Ely, Donald P. (ed.). "The Changing Role of the Audio Visual Process in Education: A Definition and a Glossary of Related Terms," *Audio Visual Communication Review*, XI, No. 1 (January-February, 1963), 148.

Evans, Luther H., and Arnstein, George E. (eds.). "Automation and the Challenge to Education." Proceedings of Symposium Sponsored by the Project on the Educational Implications of Automation. Washington, D. C.: National Education Association, 1962.

Finn, J. D. "The Emerging Technology of Education," in *Educational Implications of Technological Change.* (Appendix IV, Technology and the American Economy) Superintendent of Documents, Washington, D. C.: February, 1966.

________, Perrin, D. G., and Campion, L. E. *Studies in the Growth of Industrial Technology I: Audio-Visual Instrumentation for Instruction in the Public Schools, 1930-1960. A Basis for Take-off.* (Occasional Paper No. 6) Washington, D. C.: National Education Association Technological Development Project, 1962.

Gentile, Ronald J. "The First Generation of Computer-Assisted Instructional Systems: An Evaluative Review," *Audio Visual Communication Review*, XV, No. 1 (Spring, 1967), 23-53.

Gerletti, Robert C. "A Report of a Process Which Adapted Certain IBM Machines to the Booking of Films." (Revised) Los Angeles, California: Los Angeles County Schools, 1964-65.

_______. "Electronic Data Processing Applied to A. V. Centers," *Audiovisual Instruction*, VI, No. 10 (December, 1961), 515-17.

Gibson, Ralph E. "The Recognition of Systems Engineering," in *Operations Research and Systems Engineering*. Edited by C. D. Flagle, W. H. Huggings, and R. H. Roy. Baltimore: Johns Hopkins Press, 1960.

Gilpin, John. "Design and Evaluation of Instructional Systems," *Audio Visual Communication Review*, X, No. 2 (March-April, 1962), 75-84.

Godfrey, Eleanor P. "The State of Audiovisual Technology 1961-1966." (Monograph 3) Washington, D. C.: National Education Association, 1967.

Goldberg, A. L. "First Steps in the Systems Approach," *Audiovisual Instruction*, X, No. 5 (May, 1965), 382-3.

Goodlad, John I. "The Future of Learning and Teaching," *Audio Visual Communication Review*, XVI, No. 1 (Spring, 1968), 5-15.

Groisser, Philmore L. "The Development of Audio-Visual Instruction in the New York City Public School System," *Dissertation Abstracts*, XIII, No. 6 (New York University, 1953), 1038.

Guidelines for the Development of a Thesaurus of Educational Terms. Office of Educational Bureau of Research, Division of Research, Training and Dissemination. Washington, D. C.: United States Department of Health, Education and Welfare, 1965. (Mimeographed)

Gunn, Hartford N., Jr. "Space Satellites and Education," *Phi Delta Kappan*, XLVII, No. 5 (January, 1967), 227.

Halperin, Michael H. "RIFLE: A System of Audio-Visual Indexing, Storage and Retrieval." Address delivered at the Audio-Visual Education Association of California Conference, Asilomar, California, January, 1965.

Harley, William G. "Techniques and Costs I, Technology and Taxes," *Saturday Review*, January 14, 1967, 52-6.

Hartjen, R. H. "Is Dial Access of Stored Audio A Behaviorally Sound Student Interface?" (Unpublished Master's Paper) University of Pittsburg (April, 1967). (Mimeographed)

Hartman, Thomas F. "Computer Assisted Instruction," *Audiovisual Instruction*, II, No. 1 (January, 1966), 22-3.

Heilbroner, R. L. "The Impact of Technology: The Historic Debate," in *Automation and Technological Change*. Edited by John T. Dunlop. New Jersey: Prentice-Hall, Inc., 1962.

Heinich, Robert. "Instructional Technology and Instructional Management: A Proposal for a New Theoretical Structure." (Unpublished Doctoral Dissertation) University of Southern California, School of Education, 1967.

________. "The Systems Engineering of Education II: Application of Systems Thinking to Instruction," in *Instructional Technology and Media Project*. Los Angeles: University of Southern California, 1965.

Hicks, W. B., and Nelson,L. "Standards for the Development of School Library Programs in California." California Association of School Librarians and Audio-Visual Education Association of California, 1967.

Hoban, C. F. *Obstacles to the Use of Audio-Visual Materials*. Forty-Eighth Yearbook of the National Society for the Study of Education. Chicago, Illinois: University of Chicago Press, 1949.

________. "The New Media and the School," *Audio Visual Communication Review*, X, No. 6 (November-December, 1962), 354.

Hope, Thomas W. "Nontheatrical Films - Interim Report No. 5," *Journal of Society of Motion Picture and Television Engineers*, LXXIII, (1964), 675-8.

Hubacheck, Carl J. "Audiovisual Control Board," *Audiovisual Instruction*, VI, No. 10 (December, 1961), 519.

Hurni, Melvin C. "The Logic of Automation," in *Modern Technology and Civilization: An Introduction to Human Problems in the Machine Age*. Edited by C. R. Walher. New York: McGraw-Hill Book Company, 1962.

International Business Machines Corporation. *Annual Report for the Year Ending December 31, 1966.* 1966.

________. *Data Processing Techniques.* "Flow Charting Techniques." White Plains, New York: Publications Department, International Business Machines Corporation, 1964.

________. "Impact of Technology on the Library Building," in *Educational Facilities Laboratories* (July, 1967), 20.

________. *Information Display*, II, No. 6 (November-December, 1965), entire issue.

________. "Instructional Films and Instructional Television," *Educational/Instructional Broadcasting*, I, No. 1 (February-March, 1968), 38-43.

Johnson, Nicholas. "Crises in Communications," *Television Quarterly*, VI, No. 1 (Winter, 1967), 21-30.

Keene, Jack. "How to Cut Corners on Catalogs," *Educational Screen and Audiovisual Guide*, XL, No. 8, No. 400 (August, 1961), 394-5.

Kershner, R. B. "A Survey of Systems Engineering Tools and Techniques," in *Operation Research and Systems Engineering*. Edited by C. D. Flagle, W. H. Huggins, and R. H. Roy. Baltimore: Johns Hopkins Press, 1960.

Knirk, Frederick G. "An Analysis of Certain Time and Cost Measures Involved in the Use of Instructional Technology System," *Dissertation Abstracts*, XXVI, No. 9 (March, 1966), 5294-5.

La Fleche, Rock. "Curriculum Materials Center." Alameda County Schools: March, 1961. (Pamphlet)

Lerner, Max. "Technology and Education." Speech at the Audio-Visual Education Association of California Annual Conference. San Francisco, California: January, 1968.

Leverenz, H. W., and Townsley, Malcolm G. *The Design of Instructional Equipment: Two Views*. (Occasional Paper No. 8) Washington, D. C.: National Education Association Technological Development Project, 1962.

Licklider, J. C. R. *Libraries of the Future*. Massachusetts: Massachusetts Institute of Technology, 1965.

Loehwing, D. A. "The Challenge of Technology." (An IDEA Occasional Paper) Dow Jones Company, 1967.

Luebbert, William F. "Information Processing in Large Communications System: Its Applications to Dynamic Control and Counting Problems," *Dissertation Abstracts*, XXVI, No. 5 (November, 1965), 2648-9.

Marker, R. W., and McGraw, Peter P. "Gaps in Educational Information Systems," in *The Computer in American Education*. Edited by Donald Bushnell and Dwight W. Allen. New York: John Wiley and Sons, Inc., 1967.

Markuson, Barbara Evans (ed.). *Libraries and Automation*. Proceedings of the Conference on Libraries and Automation at Warrenton, Virginia, May, 1963. (1964)

Martin, E. W., Jr. *Electronic Data Processing*. Homewood, Illinois: Richard D. Irwin, Inc., 1965.

McCarty, Henry R. *Educational Telecommunications: The Media System of the Future*. Report to the Public Schools Instructional Television Committee, Fresno, California, April 24, 1968.

McClendon, Paul I. "Dial Access Audio-Video System," in *Seminar on Remote Access Systems: Audio/Video Retrieval*. Oklahoma Christian College, September, 1967.

McMurry, Glenn. *Southern California Automated Cataloging Project*. Final Report to United States Department of Health, Education and Welfare. (Contract No. OE4-16-031) Los Angeles: University of Southern California, June, 1967.

Meierhenry, Wesley C. "Innovation, Education, and Media," *Audio Visual Communication Review*, XIV, No. 4 (Winter, 1966), 451-65.

Merton, Robert K., Fiske, Marjorie, and Kendall, Patricia. *The Focussed Interview - A Manual*. New York: Columbia University, Bureau of Applied Social Research, September, 1952.

Miller, Elwood E. "A Descriptive Study, Evaluation and Analysis of Instructional Systems Development Activities in Selected Departments at Michigan State University from 1960-1963," *Dissertation Abstracts*, XXVI, No. 8 (February, 1966), 4340-1.

Miller, Neal E., *et al.* "Graphic Communication and the Crisis in Education," *Audio Visual Communication Review*, V, No. 3 (1957), 120.

Minor, Edward O. "An Analytical Study of Audio-Visual Programs in Four Year Accredited Negro Colleges and Universities," *Dissertation Abstracts*, XIV, No. 10 (Indiana University, 1954), 1587-8.

Mitchell, Maurice. "Who Shapes Education?" Address at the School Library Workshop for Leadership Personnel, Monte Corona Conference Center, California, August 6-12, 1967. Department of Education, Bureau of Audio-Visual and School Library Education.

Moncreiff, Bruce. "Data Processing," *Audiovisual Instruction*, VIII, No. 8 (October, 1963), 565.

Montgomery, E. B. "Reply to Questions About Systems," *Audiovisual Instruction*, X, No. 5 (May, 1965), 366-70.

Morris, Barry (ed.). *The Function of Media in the Public Schools.* (Position Paper) Washington, D. C.: National Education Association, Department of Audiovisual Instruction, September, 1962.

Mumford, Lewis. "The Automation of Knowledge," *Audio Visual Communication Review*, XII, No. 3 (Fall, 1964), 261-76.

Murphy, George H. (Compiled by). *Education Code 1965.* Sacramento, California: Department of General Services, Documents Section.

Murphy, Judith, and Gross, Ronald. *Learning by Television.* New York: The Fund for the Advancement of Education, 1966.

Nelson, Theodor H. "Computer-Index Film Handling." Poughkeepsie, New York: Vassar College. (Mimeographed)

Nichols, H. L. *Compilation of Data Pertaining to Audio-Visual Services of County Superintendents of Schools Offices*. California State Department of Education, 1968. (Mimeographed)

_______. "Guidelines to Audio-Visual Cataloging by Means of Data Processing," Sacramento: California State Department of Education, 1966.

North, Ross Stafford. "Mediated Instruction by Remote Access," in *Seminar on Remote Access Systems: Audio/Video Retrieval*. Oklahoma: Oklahoma Christian College, September, 1967.

Oettinger, Anthony G. "The New Myths of Educational Technology," *Saturday Review*, May 18, 1968, 76-7, 91.

_______, and Marks, Sema. "Educational Technology: New Myths and Old Realities," *Harvard Educational Review*, 38, No. 4 (Fall, 1968), 697-717.

O'Toole, John F. "Systems Analysis and Decision-Making in Education." Second Annual Dr. Emery Stoops Lecture Paper Presented to Alpha Epsilon Chapter, Phi Delta Kappa, University of Southern California, May, 1965. (Mimeographed)

Paquette, Russell. "Software: The Art, the Science, the Industry," *S. D. C. Magazine*, XI, No. 3 (March, 1968), 1-15.

Price, Derek J. De Solla. *Little Science, Big Science*. New York: Columbia University Press, 1963.

Public Policy Issues - Reply. Comments of the Ford Foundation Before the Federal Communications Commission. (In the matter of the establishment of domestic Communication satellite facilities by nongovernment entities.) (I, No. 16495) Washington, D. C.: December 12, 1966.

Rajchman, Jan A. "The Shrinking Computer," *New York Times*, Section 11, May 23, 1965, 36.

Reiger, S. H. "Global Tete-a-Tetes: A Satellite Repeating System," *Electronics World*, XLII, No. 3, No. 419 (February, 1968), 30-1.

Roberts, Thomas W. "An Efficient Film Filing System," *Educational Screen and Audiovisual Guide*, XLII, No. 3, No. 419 (March, 1963), 140-1.

Rohrbacher, Donald L. "Future Hardware For Electronic Information Handling Systems," in *Electronic Information Handling*. Washington, D. C.: Spartan Books, Inc., 1965.

Sable, Jerome D. "Language and Information Structure in Information Systems," *Dissertation Abstracts*, XXIV, No. 5 (November, 1963), 1964.

Schramm, Wilbur. "Satellites for Education," *Educational Broadcasting Review*, II, No. 1 (February, 1968), 8-11.

Schure, Alexander. "Educational Escalation Through Systems Analysis," *Audiovisual Instruction*, X, No. 5 (May, 1965), 371-7.

Silvern, L. C. "Reply to Questions About Systems," *Audiovisual Instruction*, X, No. 5 (May, 1965), 366-70.

Social Studies Project Report V. *The Pursuit of Excellence - Education and the Future of America.* (America at Mid-Century Series) Garden City, New York: Rockefeller Brothers Fund, Inc., Doubleday and Company, Inc., 1958.

Springer, C. H. "Techniques and Costs II, The Systems Approach," *Saturday Review*, January 14, 1967, 56-7.

Stewart, D. K. "The Articulated Instructional Media Program at the University of Wisconsin," *Audiovisual Instruction*, X, No. 5 (May, 1965), 381.

Stone, C. Walter. "Some New Frontiers for Newer Media," *Audio Visual Communication Review*, IX, No. 4 (July-August, 1961), 163-72.

Suppes, Patrick. "The Computer and Excellence," *Saturday Review*, January 14, 1967, 46-50.

Taulbee, Orrin E. "New Mathematics for a New Problem," in *Electronic Information Handling*. Washington, D. C.: Spartan Books, Inc., 1965.

Teichroew, Daniel. "Information Systems in Information Display," *Information Display*, II, No. 6 (November-December, 1965), 35.

Thomson, James C., Jr. "From Reason to Technology," *Educational Technology*, VIII, No. 6 (March 30, 1968), 3-8.

Tracey, W. R., Flynn, E. B., Jr., and Legere, J. "Systems Approach Gets Results," *Training in Business and Industry*, IV, No. 6 (June, 1967), 17.

Trippon, Marianne. "PLATO at Work," *Phi Delta Kappan*, VXLIX, No. 8 (April, 1968), 430-42.

Vandermeer, A. W. "Systems Analysis and Media - A Perspective," *Audio Visual Communication Review*, XII, No. 3 (Fall, 1964), 292-301.

Vento, Charles J. "PERTing the Automated Catalog," *Audiovisual Instruction*, III, No. 3 (March, 1966), 182-5.

_______. "Teacher Acceptance or Rejection of the New Instructional Media and Consequent Effectiveness." (1963) (Mimeographed)

Vivrette, Lyndon. "We Put Our A/V Catalog on I.B.M.," *Audiovisual Instruction*, VII, (May, 1962), 302-3.

Whiteneck, Carolyn I. "A National Catalog for A. V.," *Audiovisual Instruction*, VI, No. 10 (December, 1961), 510-11.

Wigren, Harold E. *What's Here in Educational Technology?* Speech at the Association for Supervision and Curriculum Development, National Education Association, Chicago, Illinois, January, 1968.